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Dental Digest

January 1953

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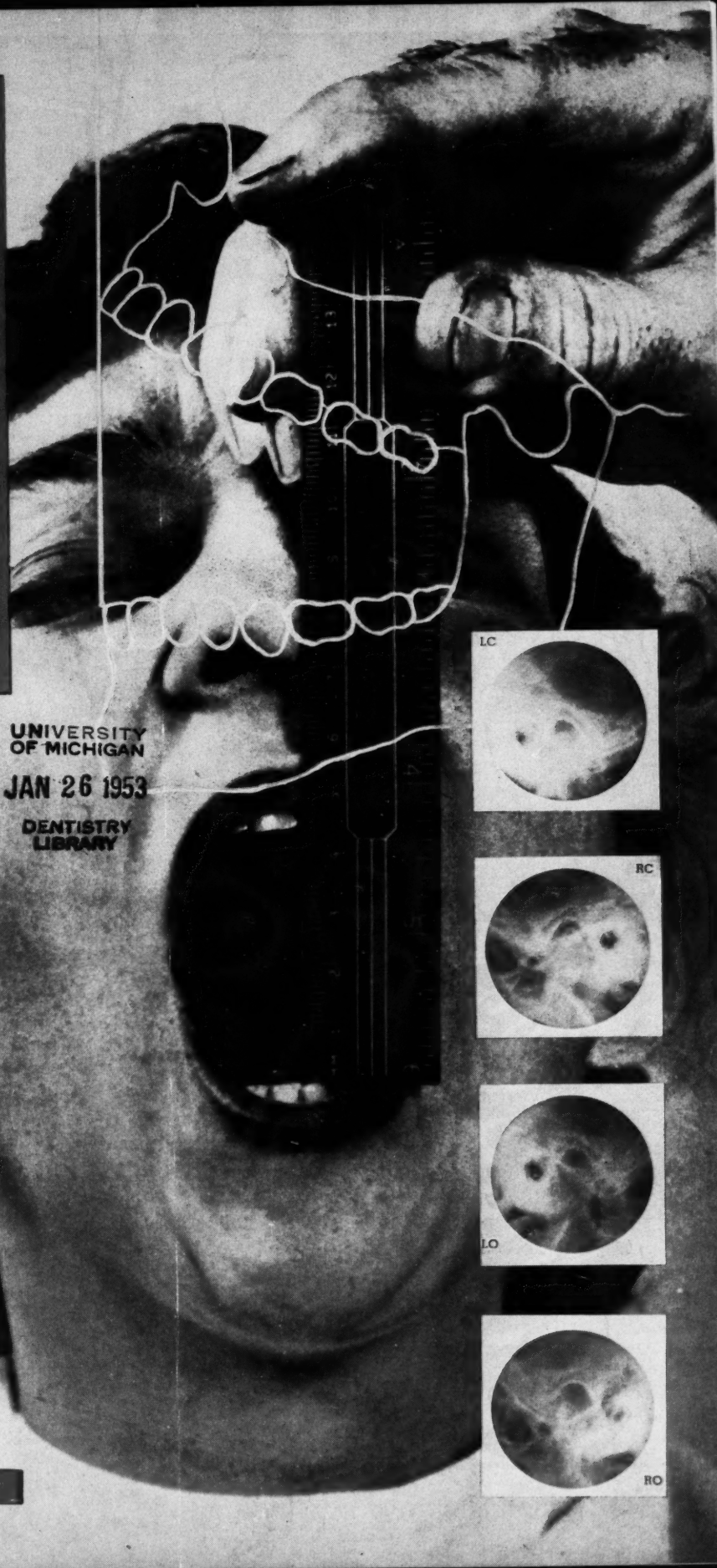
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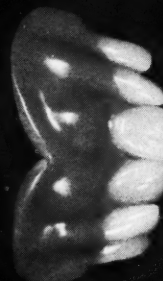
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A N T E R I O R S

Dental Digest

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JANUARY 1953

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HYDROCORTISONE

*in Dental Practice**

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Rahway, N. J., and
CHARLES PINCKNEY HORTON,
B.S., D.D.S., New York

DIGEST

In a previous publication¹ the possible role of cortisone (Kendall's compound E) in dental medicine was discussed and some of the physiologic effects of this hormone were emphasized. The present article describes the results of clinical trial with hydrocortisone (Kendall's compound F), a related hormone, in a variety of oral conditions refractory to other forms of therapy.

Structure

Hydrocortisone is similar to cortisone with the exception of position C-11. With hydrocortisone this position is occupied by a hydroxyl group, and with cortisone by a ketone (Fig. 1).

Like cortisone, hydrocortisone is a potent hormonal substance and definite physiologic effects are to be expected from its systemic use. When hydrocortisone acetate is applied topically, however, or injected into a joint, the amount of hormone absorbed is too small to produce physiologic effects elsewhere in the body.

Because of its safety in low dosage an attempt was made to establish the role of this hormone in dental medicine.

*The illustrations are from the Scientific Exhibit presented at the 93rd Annual Session of the American Dental Association, St. Louis, Mo., Sept. 8-11, 1952.

¹Strean, L. P.: The Possible Role of Cortisone in Dental Medicine, New York J. Dent. 22:102-104 (March) 1952.

Clinical Effects of Hydrocortisone**

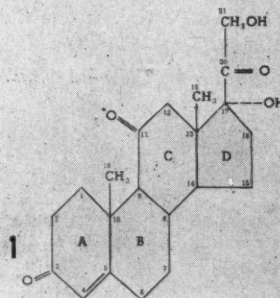
It has been observed that arthritic patients under treatment with cortisone or corticotropin may find that one or more joints do not respond to

therapy. Because of the anti-inflammatory effect of hydrocortisone, joints refractory to systemic treatment frequently respond to intra-articular injection of the hormone.

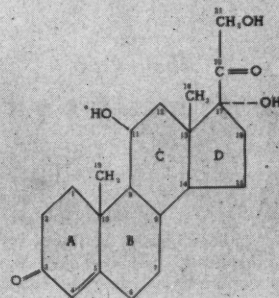
**Hydrocortone®, the Merck brand of hydrocortisone acetate, was the material used in this study.

CORTISONE AND HYDROCORTISONE RELATIONSHIP OF CHEMICAL STRUCTURE

CORTISONE (Kendall's compound E)
11-dehydro-17-hydroxycorticosterone

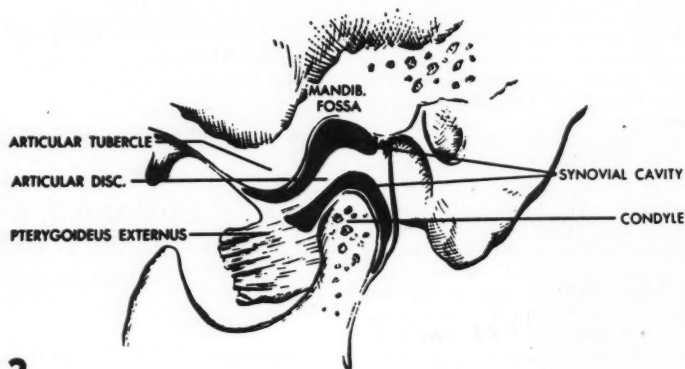


HYDROCORTISONE (Kendall's compound F)
17-hydroxycorticosterone

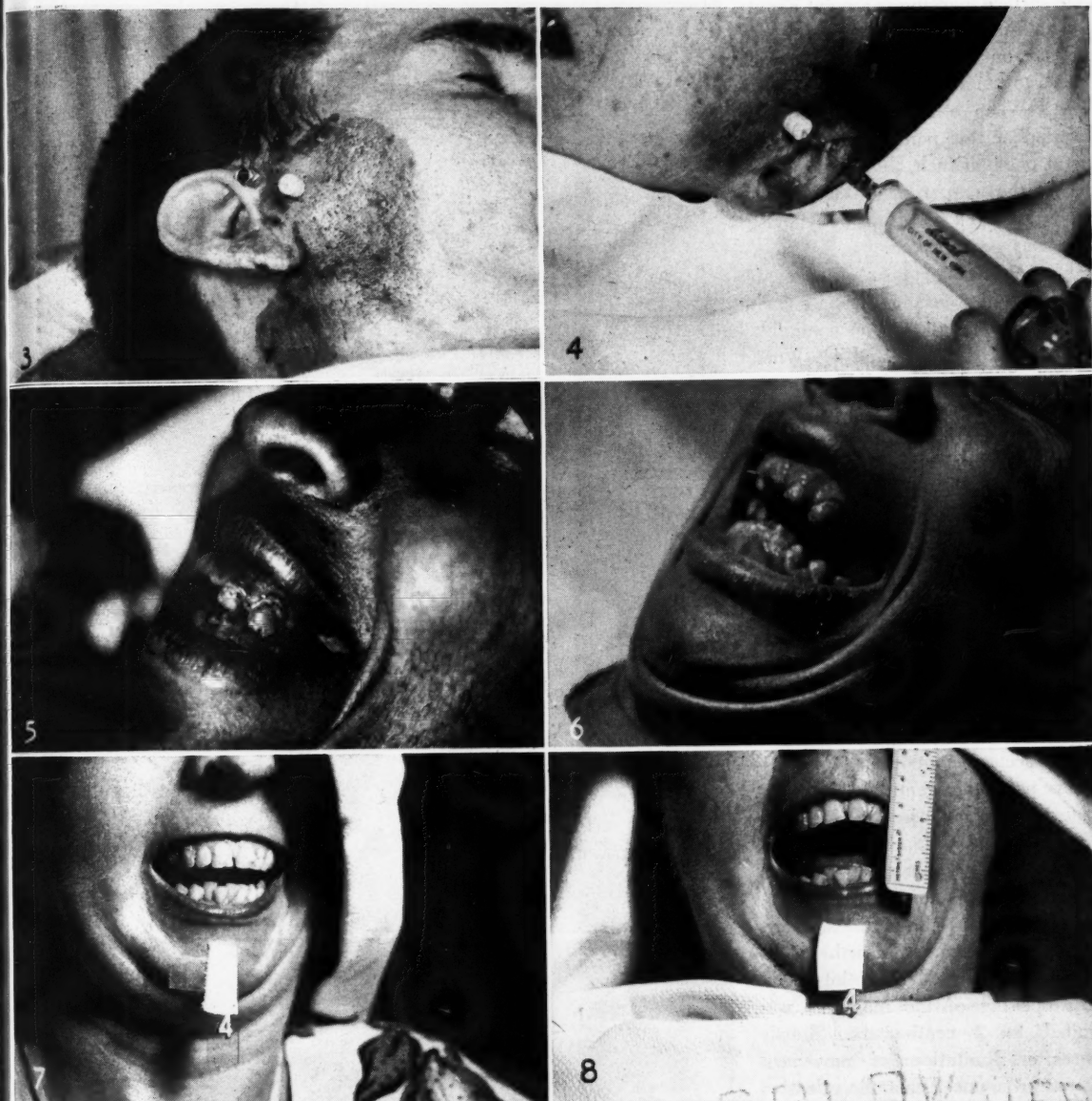


1. Cortisone and hydrocortisone. Relationship of chemical structure.

SAGITTAL SECTION OF THE ARTICULATION OF THE MANDIBLE



2. Note two synovial cavities, one on either side of the articular disc.



3. Needle in joint after injection of 2 per cent procaine.

4. Injecting hydrocortisone.

5. Before treatment. The joint was frozen for more than nine years. Maximum opening of jaws is shown.

6. Eighteen hours after the first injection.

7. Before treatment.

8. Twenty-four hours after the first injection.

Technique for Injection of Temporomandibular Joint—Following the favorable reports of Hollander, et al² dealing with the intra-articular injection of various arthritic joints with hydrocortisone, an attempt was made by the authors to develop a technique for injection of the temporomandibular

joint in patients with limited motion of the mandible.

Anatomy of Area—For successful injection of the temporomandibular joint with hydrocortisone acetate saline suspension, a knowledge of the anatomy of the area is important. In Figure 2 it is seen that there are two synovial cavities separated by the articular disc. These sacs are situated between the mandibular (glenoid)

fossa of the temporal bone and the condyle of the mandible. The injection is made preferably into the upper chamber. Roentgenographic examination of the joint with the mandible in open and closed position will be helpful in locating the most desirable injection site.

Method of Injection—(1) Experience with injections of the temporomandibular joint reveals that a reli-

²Hollander, J. L., et al: Hydrocortisone and Cortisone Injected into Arthritic Joints: Comparative Effects of and Use of Hydrocortisone as a Local Antiarthritic Agent, *J.A.M.A.* **147**:1629-1635 (Dec. 22) 1951.

able surface marking is a point about one-half inch anterior to the tragus of the ear on a line drawn from the tragus to the ala of the nose.

(2) When a 22-gauge needle is inserted at this point to a depth of about one-half inch, the upper chamber of the temporomandibular joint is pierced and a few drops of synovial fluid may be aspirated.

(3) A sterile rubber stopper attached to the needle one-half inch from the point will serve as a suitable depth gauge (Figs. 3 and 4). When possible the injection should be made with the mouth propped open.

(4) By following this technique, piercing the superficial temporal artery which lies distal to the temporomandibular joint will be avoided. If the artery has been pierced, however, blood will flow into the syringe. The needle should be withdrawn and re-directed anteriorly.

5. To avoid pain the tissue over the joint should be infiltrated with a small quantity of local anesthetic.

6. A saline suspension of hydrocortisone acetate containing 25 milligrams per cubic centimeter was the material used for injection.

Case One

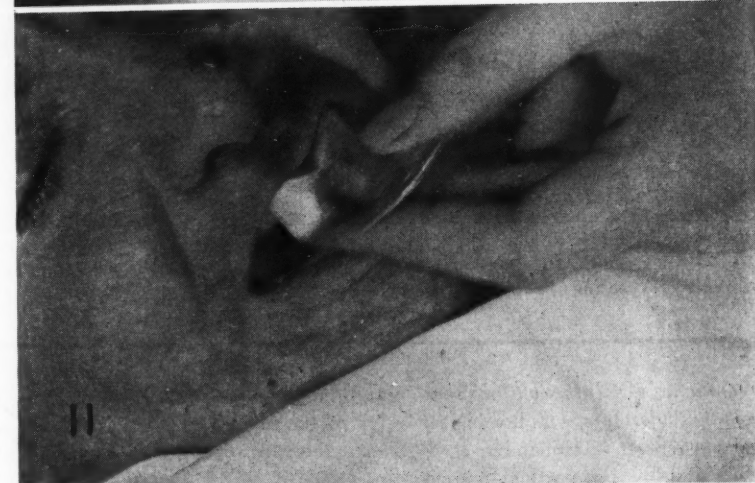
Mrs. E. W., age 38, Negro, was admitted to hospital nine years previously with rheumatoid arthritis involving virtually all the joints. Vertical opening of the mandible was limited to 2 centimeters. Shortly thereafter limitation of movement was so pronounced that she subsisted only on a liquid diet. This condition persisted for nine years.

Treatment—Each temporomandibular joint was injected with 0.5 cubic centimeters hydrocortisone acetate saline suspension.

Results—Eighteen hours after injection the vertical opening of the jaws was 4 centimeters which increased to 5 centimeters six hours later (Figs. 5 and 6). The second remission lasted for four months. A third injection was then required.

Case Two

Mrs. G. K., age 40, white, was admitted to hospital five years previously with severe rheumatoid arthritis. Vir-



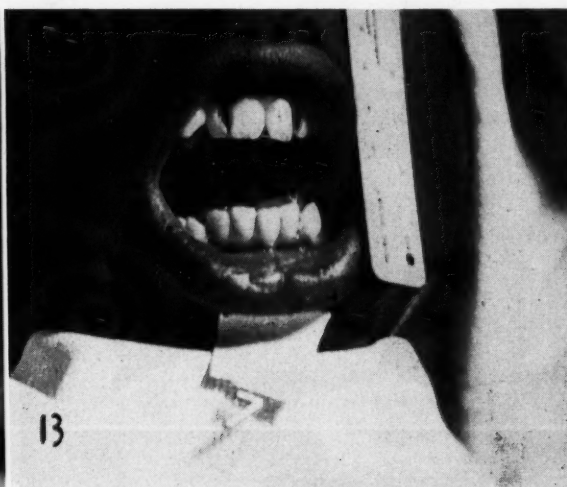
9. An edentulous patient. Opening of the jaws was too limited to permit taking impressions. Before treatment.

10. The patient shown in Figure 9. Twenty-four hours after second injection which was given after an interval of four weeks.

11. Two months after the second injection. Taking impressions is still possible.



12. Before treatment. The teeth could not be prepared for suitable restorations.



13. Twenty-four hours after first injection. Note increased vertical dimension and silicates in upper centrals.

tually all the joints, including the temporomandibular, were involved. Vertical opening of the jaws was limited to 1.5 centimeters.

Systemic Treatment Received—Recently the patient had been receiving systemic treatment with cortisone. Only a few joints were demonstrably improved and no beneficial effect was observed in the temporomandibular joint. The previously inflamed gingivae, however, showed no signs of inflammation while the patient was under treatment with cortisone.

Treatment—The patient was unable to eat solid food because of limited motion of the mandible. Each temporomandibular joint, therefore, was injected with 0.5 cubic centimeters hydrocortisone acetate saline suspension.

Effect of Treatment—Eighteen hours after injection the vertical opening was increased to 3 centimeters (Figs. 7 and 8) with pronounced improvement in lateral motion. Additional injections were necessary to maintain this remission.

Case Three

Mr. J. M., age 42, white, was admitted to hospital suffering from severe rheumatoid arthritis which also involved the temporomandibular joint.

The patient was edentulous and unable to wear dentures because the mouth could not be opened sufficiently to enable the dentist to take impressions (Fig. 9).

Treatment—Each temporomandibular joint was injected with 0.5 cubic centimeters hydrocortisone acetate saline suspension.

Extent of Remission—While the vertical opening of the jaws was increased to a limited extent, a second injection was deemed necessary one month later. Subsequently the vertical opening increased further and impressions for dentures were taken (Figs. 10 and 11). The remission lasted three months. At that time another injection

was made in each temporomandibular joint.

Case Four

Mr. R. B., age 21, Negro, was admitted to hospital with rheumatoid arthritis. The patient's teeth were carious but operative procedures could not be performed because he could not open his mouth sufficiently to permit insertion of a handpiece and bur.

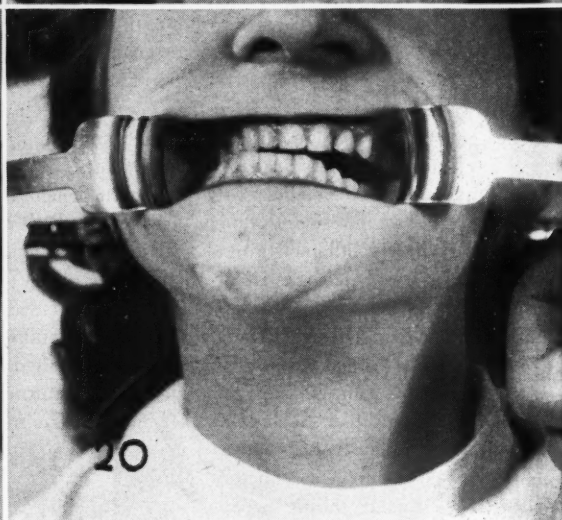
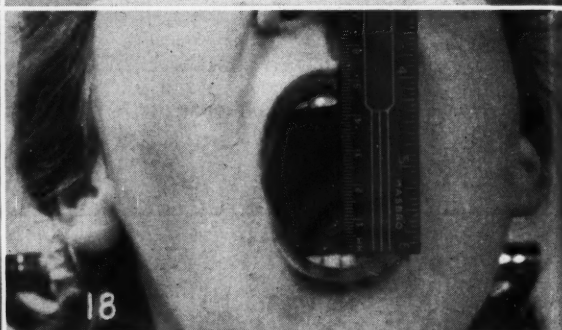
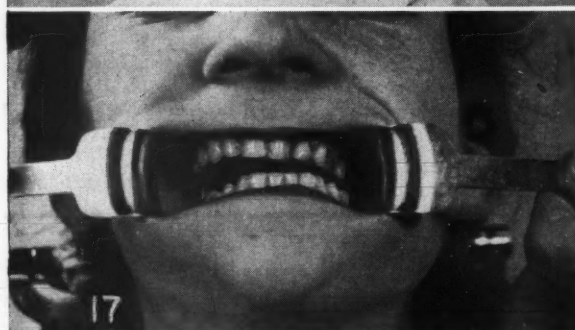
Treatment—Each temporomandibular joint was injected with 0.5 cubic centimeters of hydrocortisone acetate saline suspension. On the following day the two upper central incisors were prepared and silicate restorations were inserted (Figs. 12 and 13).

TEMPOROMANDIBULAR JOINT TREATMENT OF UNILATERAL SUBLUXATION BY INTRA-ARTICULAR INJECTION OF HYDROCORTISONE

ROENTGENOGRAPHIC FINDINGS IN FEMALE PATIENT, AGE 19



14. LC—left closed. RC—right closed. LO—left open. RO—right open.



15. Teeth in rest position. Note asymmetry of facial contour.

16. Before treatment. Opening is 32 millimeters.

17. Before treatment. Limited and painful excursion to the left.

18. Forty-eight hours after intra-articular injection of hydrocortisone, saline suspension, 0.5 cubic centimeters

(12.5 milligrams) in each temporomandibular joint. Opening 44 millimeters.

19. Forty-eight hours after treatment. Increased movement to left with absence of pain.

20. Forty-eight hours after injection. Right excursion of the mandible is not appreciably changed; however, there is less tendency to assume this exaggerated movement.

Result of Treatment — Vertical opening in this case has been maintained for three months without additional injections.

Case Five

Miss S., age 19, white, was an ambulatory patient. Roentgenographic examination of the temporomandibular

joint revealed limited motion of the right condyle with subluxation of the left (Fig. 14). Sclerosing agents were used to reduce the subluxation



21. Desquamative gingivitis treated topically with hydrocortisone ointment (25 milligrams to 1 gram). Before treatment.

22. The case shown in Figure 21, after treatment. Note the improvement particularly over the anterior teeth.

which resulted in a limitation of motion in both joints. When the effect of the sclerosing solution wore off the unilateral subluxation returned. At this stage the vertical opening of the jaws was 32 millimeters with a painful left lateral excursion (Figs. 15, 16, and 17).

Treatment of Joints—Each temporomandibular joint was injected with 0.5 cubic centimeters of hydrocortisone saline suspension although it probably was not necessary to inject the left joint.

Effects of Therapy—Within forty-eight hours the vertical opening was increased to 44 millimeters and the left lateral excursion of the mandible was no longer painful. The right excursion of the mandible was not appreciably changed. There was less tendency, however, to assume an exaggerated excursion to the right (Figs. 18, 19, and 20).

Root Canal Therapy

It has been observed that following pulpectomy and reaming of root canals, the resulting trauma in the periapical area frequently produces a periodontitis which may be quite severe. This condition is often aggravated by the use of chemical irritants. Since hydrocortisone is an anti-inflammatory agent, its effect in root canal therapy is now under investigation.³

Treatment—The patients selected for this clinical trial had dental caries

which invaded the pulp tissue but the periapical areas were nongranulomatous. In these cases the following measures were taken:

1. After pulpectomy, reaming, and lavage with sterile distilled water, hydrocortisone saline suspension was pumped through the apex.
2. A sterile paper point saturated with the hormone was inserted in the root canal.
3. A pledget of cotton saturated with sodium penicillin G was placed in the pulp chamber and sealed under pressure with gutta percha.

Results of Treatment—In ten successive cases no postoperative inflammation was experienced. Further clinical trial is continuing to determine whether this route of administration of the hormone is the most effective.

Other Methods Investigated—A series of patients is now being treated by injection of the hydrocortisone acetate saline suspension into the periapical area intraosseously and suprapariosteally. Its compatibility with other antibiotics is also being investigated.

Treatment in Gingival Inflammation

Hydrocortisone acetate ointment (25 milligrams per gram) has been proved to be effective in the treatment of various inflammatory eye diseases and various dermatologic conditions. The next logical step was to test the anti-inflammatory effect of this hormone when applied topically to in-

flamed gingivae. The patients were instructed to put a finger cot on the index finger and rub the ointment into the gingival tissue twice per day, after the noon meal and at bedtime.

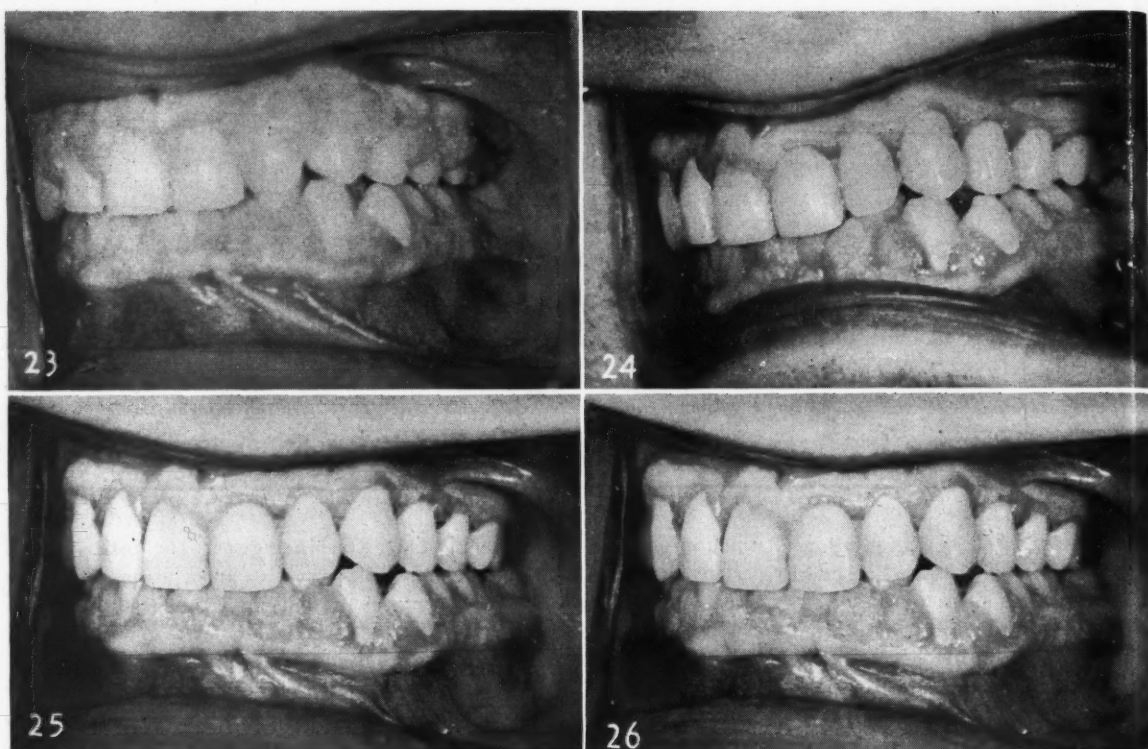
Failure of Other Forms of Therapy—In the patients selected the agents previously used without success included antibiotics, antiseptics, oxidants, astringents, and dyes. Existing conditions were (1) traumatic occlusion, (2) restorations with overhanging margins, (3) faulty crowns, and (4) interdental crevices permitting food impaction.

Results of Treatment—In fifteen such cases the inflammation subsided several days after treatment was initiated. Naturally, permanence of cure cannot be expected until the causative factor is eliminated.

Improvement in Desquamative Gingivitis—Desquamative gingivitis would appear to be a disease of the menopause and has been refractory to all forms of treatment. Five patients selected for treatment with hydrocortisone acetate ointment in all instances showed demonstrable improvement within a few weeks (Figs. 21 and 22). This treatment may have to continue for the duration of the menopause because of the attendant hormonal imbalance during that period.

Gingival Hypertrophy—Epileptic patients under treatment with dilantin are known to be subject to gingival hypertrophy. Following gingivectomy the hypertrophic tissue seems to return in those cases where the drug is

³Wolfsohn, B. L.: Personal communication.



23 and 24. Dilantin hyperplasia. Only the upper left side was treated, the other areas of the gingivae served as controls. Before treatment and four weeks after surgery and

daily application of hydrocortisone.

25. After two months' treatment.

26. After three months' treatment.

continued. Since hydrocortisone inhibits fibroplastic proliferation, an attempt was made to study the effect of this hormone when applied topically to the gingivae after surgical removal of the hypertrophied tissue.

Method of Application — 1. The ointment was applied twice per day for a period of three months.

2. During this time the patient continued the dilantin and the gingivae showed no demonstrable evidence of hypertrophy.

3. Following this period the hormonal treatment was purposely interrupted.

4. Two months later the gingivae began to show regrowth of tissue. Treatment with the hydrocortisone acetate ointment was reinstituted. Shrinkage of hypertrophied tissue was apparent (Figs. 23 and 27).

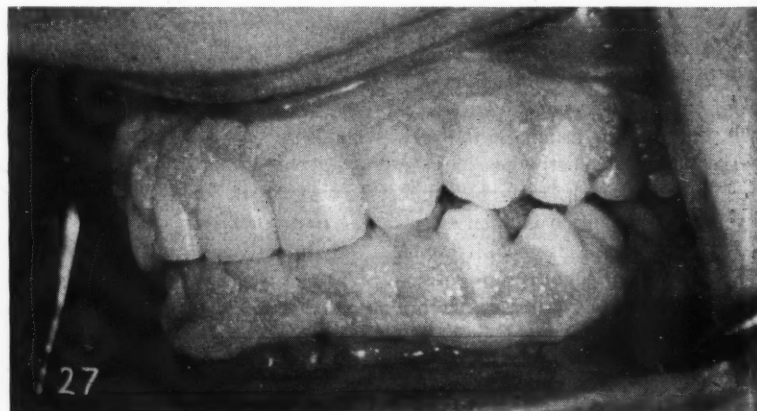
Response Shown in Other Conditions — Hydrocortisone acetate ointment has also shown promise in leukoplakia, glossitis, aphthous ulcers,

drug allergies, and burns of the mouth limited to the mucous membrane.

Procaine Dermatitis

Hypersensitivity to procaine or its derivatives has caused many dentists to discontinue the practice of their profession, in some cases temporarily,

in others permanently. If the allergy is limited to the area of contact, usually the hand, topical application of hydrocortisone acetate ointment may be all that is necessary for relief. One dentist so treated is maintaining his practice. In severe cases it may be necessary to supplement the topical



27. Two months after treatment with hydrocortisone was discontinued.

Response to Hydrocortisone in Various Diseases Confronting the Dentist

Saline suspension of the acetate injected into temporomandibular joint for diseases involving the T. M. joint

Beneficial Effects

- *Rheumatoid Arthritis
- *Osteoarthritis
- *Acute Disseminated Lupus Erythematosus
- Trauma—Direct to joint
 - Resulting from traumatic occlusion

By Lavage in Root Canal Therapy

Periodontitis

*Systemic disease treated with hydrocortisone or cortisone (injectable saline suspension or oral tablets) under the supervision of a physician.

Topical application of dental ointment

Beneficial Effects

- Acute and Chronic Gingivitis
- Desquamative Gingivitis
- Dilantin Hyperplasia
- Leukoplakia
- Glossitis
- Aphthous Ulcers
- Drug Allergies (limited to oral mucous membrane)
- Burns (limited to mucous membrane)

In Diseases other than Oral

Procaine Dermatitis

**Systemic treatment indicated with hydrocortisone or cortisone for oral manifestations of systemic disease

Beneficial Effects

- Angioneurotic Edema
- Penicillin Sensitivity
- Pemphigus
- Periarteritis Nodosa
- Acute Leukemia (lymphocytic or granulocytic)
- Aphthous Stomatitis
- Allergic Stomatitis
- Idiopathic Thrombocytopenic Purpura

**Injectable saline suspension or oral tablets under the supervision of a physician.

N. B. Hydrocortisone Acetate in Saline Suspension; Hydrocortisone Free Alcohol in Tablets.

treatment with systemic use of corticotropin, cortisone, or hydrocortisone.

Oral Manifestations of Systemic Disease

Many diseases amenable to systemic treatment with cortisone, hydrocortisone, or corticotropin may be detected by the dentist. In fact, early symptoms of some of these diseases where the mortality rate is extremely high are manifest in the mouth.

Immediate Treatment Important—Early recognition by the dentist and immediate treatment by the physician may prove life-saving. This is particularly true with pemphigus vulgaris where frequently the bullae are first seen on the mucous membrane of the mouth. Early systemic treatment with corticotropin, cortisone, or hydrocortisone has saved the lives of many patients.

Improvement in Systemic Disease—(1) Angioneurotic edema and urticarial rashes resulting from the use of penicillin or other drugs usually respond to treatment with corticotropin, cortisone, or hydrocortisone.

28. Chart showing response to hydrocortisone in various diseases confronting the dentist.

(2) Periarteritis nodosa, acute leukemia (lymphocytic or granulocytic) and thrombocytopenic purpura frequently show manifestations in the gingivae and on the palate.

Local Conditions Differentiated from Systemic Conditions—It is important that these diseases be differentiated from purely local conditions for which local treatment may be effective. While these three systemic diseases may be serious, corticotropin, cortisone, or hydrocortisone administered systemically have prolonged life and produced a feeling of well-being in the treated patients.

Stomatitis—Aphthous stomatitis and allergic stomatitis may be widespread in the oral cavity. Systemic therapy with corticotropin, cortisone, or hydrocortisone may be advisable; the results of such therapy have been encouraging.

Response in Diseases Confronting the Dentist

Discussion—Figure 28—Hydrocortisone acetate saline suspension administered by intra-articular injection in the temporomandibular joint has had a beneficial effect in cases of limited motion of the mandible. Undesirable physiologic effects have not been observed nor would they be expected because of the low dosage of hormone used.

Rationale for Therapy—The established anti-inflammatory effect of the hormone is the basis for the rationale for this mode of therapy. Arthritis of the temporomandibular joint is considered a collagen disease and evidence has been produced that the pattern of the collagen fibres is changed following the use of hydrocortisone. While the change may appear to be only histologic, chemical changes may also take place which might alter the glue-like consistency of these fibres.

Injection of Joint Sometimes Necessary—In arthritic patients injection of the temporomandibular joint be-

comes necessary when systemic treatment with cortisone, hydrocortisone, or corticotropin has not had a sufficiently beneficial effect on this joint. In patients suffering from limitation of movement of the mandible for reasons other than arthritis, systemic treatment with these hormones is not necessary.

Injection Required only in Joint Showing Limitation of Motion—Limitation of condylar motion may result from trauma or traumatic occlusion. Frequently the limitation of motion is restricted to one side and subluxation is evident on the other side. This is probably a compensatory mechanism.

Authors' Note: Appreciation is expressed to J. J. Martini, D.D.S., Passaic, N.J., and E. Byron Master, D.D.S., Newark, N.J., for their courtesy in providing some of the illustrations for this article.

Bands On Teeth

CONSIDERABLE comment has been made on the subject of orthodontic bands being responsible for various discolorations, etchings, and other defects.

An informal inquiry among various orthodontists of wide clinical experience points up the fact that the "voice of experience" seems to leave little doubt that the principal cause of these defects, disintegration of cement under the band, seems to be overlooked by those who are casting about for some facts to be assembled.

If you have practiced orthodontics as a specialty for over five years, you have learned that a band over a tooth without cement under it soon reveals a blanching of the tooth, and a softening of the enamel. This obviously needs no scientific explanation other than that decomposition occurs as a byproduct of putrefaction.

ism. These cases require injection of hydrocortisone acetate only in the temporomandibular joint showing limitation of motion.

Rationale of Beneficial Effects

The beneficial effects of inflamed gingival tissue observed following topical application of hydrocortisone acetate in an ointment base are considered to be due to the absorption of the hormone by the mucous membrane thereby permitting the hormone to exert its anti-inflammatory effect. Credence to this view is supported by response to treatment in cases of acute and chronic gingivitis, and desquamative gingivitis.

Inhibitory Effect on Fibroplastic Proliferation—In patients with dilantin hyperplasia it is reasonable to suppose that the inhibitory effect upon fibroplastic proliferation prevents re-

growth of hypertrophic tissue following gingivectomy. In treatment without gingivectomy, however, it is conceivable that the hormone has a direct effect on the collagenous tissue that might be present in the overgrowth.

Role of the Dentist—In those systemic diseases which have oral manifestations and are amenable to systemic treatment with corticotropin, cortisone, or hydrocortisone, the dentist can be extremely helpful by aiding in the diagnosis and then referring the patient to a physician for medical care. The dentist should limit treatment with hydrocortisone to injection of the temporomandibular joint and topical application to tissues of the oral cavity. The only exception might be in cases of procaine dermatitis frequently found on the hands and not requiring systemic treatment.

Rahway, New Jersey.

The most common line of demarcation left on a tooth with a cemented band is a line outlining the edge of the band. This is obviously due to the disintegration of a cement line exposed directly to the saliva. Cement a band on a tooth and allow only a small portion of the band to be sealed with cement, and it is hazardous to the tooth structure during treatment.

Many orthodontists say there is very little etching or discoloration of teeth that are covered with orthodontic bands if meticulous care is observed in removing bands from time to time and care is taken in cementing them.

Nine times out of ten, where etching or discoloration is found, you will find that the band is uncemented at some spot where it is in contact with the tooth. Another common spot for discoloration of tooth structure as a

result of orthodontic bands is the buccal surface of the lower first molar.

That all bands on teeth undergoing orthodontic treatment should be removed and reset with new cement from time to time seems to be well agreed.

It is obvious, however, to those of wide orthodontic experience that once orthodontic bands have been placed on teeth, and one or more teeth suffer from dental caries at any time during the lifetime of the patient, the orthodontic bands will be blamed. The statute of limitations never expires on blaming orthodontic bands for the decay of teeth. That is one reason orthodontists "lean backwards" to check during treatment.

Adapted from Editorial, *American Journal of Orthodontics* 38:875 (Nov.) 1952.

The Art and Science

of FULL MOUTH REHABILITATION

IRVING GOLDMAN, D.D.S., New York

DIGEST

This article describes the basic concepts of full mouth rehabilitation, and rather than to advocate one particular technique, discusses the problems common to all the techniques that may be employed. Although there are difficulties in planning the procedure and it is not possible to lay down definite and specific rules to fit each case, nevertheless there are certain well-defined principles which serve as guides. These principles, the objectives of the procedure, treatment-planning, techniques, and prognostication are thoroughly discussed.

General Considerations

It is obvious that a well-defined plan of procedure should exist to guide the operator in organizing and completing any type of treatment. In the treatment of caries, for example, the formula outlined by G. V. Black is followed, both in terminology and procedure for cavity preparation. After the dentist has determined the type of cavity presented he can follow the specific directions set forth by Black and if his techniques are adequate, be assured that the results will be satisfactory.

Classifications Almost Impossible

—Mouths requiring reconstruction, however, present a variety of deviations from the normal requirements for healthy function; thus classification is almost impossible and specific directions applicable to all cases cannot

be formulated. The dentist must rely on his ability to ascertain the deviations, and to visualize how best to return the mouth to satisfactory physical function.

Fundamentals of Full Mouth Rehabilitation—The procedure of full mouth rehabilitation involves the following essential steps: (1) Determining the elements which have brought about malfunctioning; (2) planning the elimination of the destructive elements; and (3) replacing destructive factors with conditions to reestablish the protective elements which nature incorporates into the healthy normal dentition.

Science and Art Required—The total procedure of full mouth rehabilitation demands the exercise of both art and science in the sense that this phrase is used in general medical practice. The operator must have genuine scientific knowledge, and also the indefinable gift, intuitive judgment.

Difficulties Constitute a Challenge

—It is suggested that one of the chief reasons why full mouth rehabilitation has not been widely adopted by the dental profession is that the procedure demands the double qualification described. The difficulties inherent in the procedure, however, should serve as a challenge, not as a deterrent.

Principles and Aims

The unrestored mouth is self-destructive; the rehabilitated mouth is self-preserving. If this basic principle

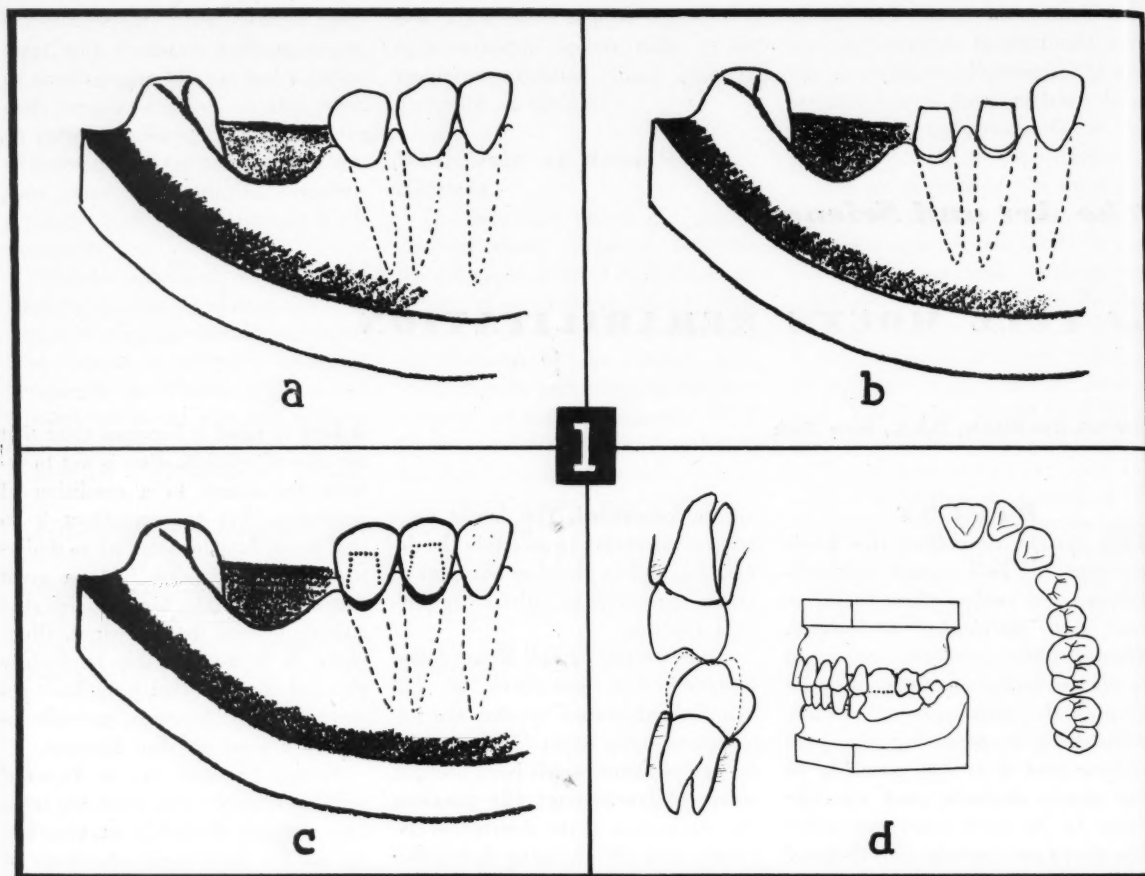
is kept in mind it becomes clear that the aim of rehabilitation is not to restore the mouth to a condition of perfection, but to reconstruct it so that it will function. Failure to understand this distinction is to a great extent responsible for the defeatist attitude toward the procedure. Obviously, it is not possible to replace physical elements that have been destroyed; it is, however, possible to restore normal physical function.

Normal Function can be Restored

—As an example, two adjoining teeth have not only drifted apart, thus losing all the physiologic advantage of proper contact relationship, but are now also subjected to unnatural wear as a result of malposition. Even if these teeth could be drawn together again, the anatomy destroyed by the unnatural wear would make it impossible for them to reassume satisfactory contact relationship. By the use of full crowns on both these teeth, all necessary anatomic relationships can be installed and proper physiology can be obtained.

An Attempt to Arrest Deterioration

—The deformity presented by the mutilated mouth must be accepted, the remaining advantages of the patient salvaged, and features that have been lost, reconstructed. This is not done in an attempt to arrive at entirely normal teeth relationships, for this is impossible, but to arrest further deterioration and to restore healthy function. Continued elongation, for instance, or tipping of teeth, and continued food impaction usually result in injury, first to the gingival tissues and later to the deeper structures of the periodontium. This in-



1A. Distally inclined lower second bicuspid. Forces directed against this root cannot be counteracted properly. Contact anatomy has been destroyed. The solution is to permit this tooth to function normally by reinforcing it by connecting it to a stable, normally positioned tooth. If one stable tooth is considered insufficient, the splint can be carried to two or more teeth.

1B. Preparation of inclined second bicuspid, also a normal first bicuspid for full crown coverage.

1C. Veneer crowns connected.

1D. Here are three common deviations of tooth position: (a) Tipped or inclined tooth (the root is not perpendicular to occlusal surface and therefore poorly equipped to resist forces against it). (b) Elongated tooth (beyond occlusal plane). (c) Rotated tooth (contact anatomy impossible to obtain). Note: As indicated in another drawing, all tipped or inclined teeth as well as mobile teeth should be rigidly connected to healthy, vertically positioned teeth to procure better resistance to vertical forces.

evitably results (1) in poor function, thus further decreasing circulation in the soft tissues, (2) in stagnation around the teeth, and (3) in hastening the caries process.

Reestablishment of Harmony—Caries is not the only destructive process with which the dentist must cope. Orthodontia, for instance, is accepted as a necessary procedure in bringing about harmony in the tooth elements when nature has failed in this attempt. Mouth rehabilitation provides the same service for the teeth which have lost harmony of the tooth elements.

Similarity of Principles—Johnson¹ states that the purpose of dentistry is to "assist in establishing and maintaining the normal functional activity of the masticatory apparatus," and that the purpose of orthodontics is to "assist nature in the development of the structural elements of the jaws, and so to harmonize the surrounding and supporting structural elements of the teeth that the whole mechanism will constitute an

¹Johnson, A. LeRoy: Basic Principles of Orthodontics, Dental Cosmos 65 : 679, 1923. Quoted by Anderson, George M., in Practical Orthodontics, St. Louis, C. V. Mosby Company, 1948.

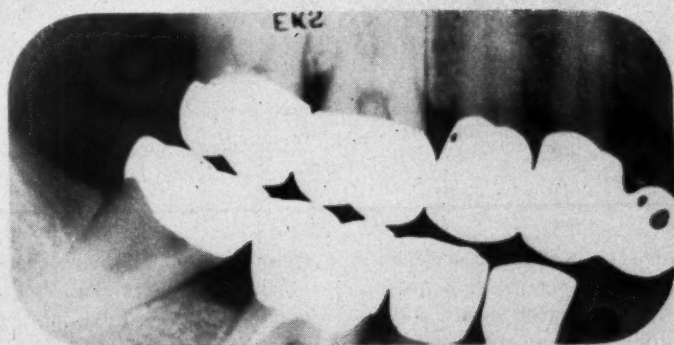
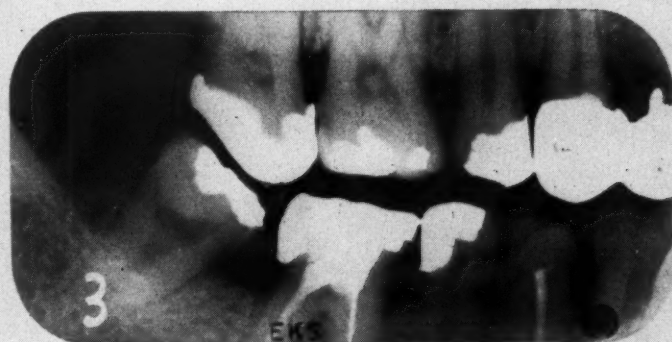
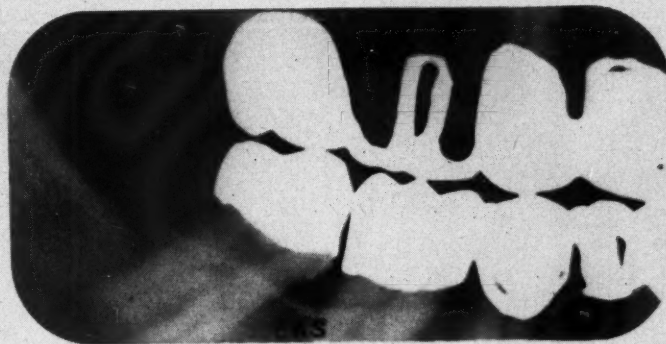
assemblage of parts best suited to the functional activities of the individual." The interweaving of the two purposes is evident.

Planning the Restoration

The first requirement for planning a restoration is a careful study of existing conditions. The best possible solution of the specific case consistent with all the factors present should be visualized. To complete this study the following procedures should be followed:

- (1) A full set of radiographs.

2. A bitewing view showing conditions before and after treatment. Note: (1) New plane. (2) Splinting (connecting crowns) of upper bicuspid, also lower first molar and second bicuspid. (3) Contact anatomy corrected. (4) Crowns reformed and repositioned. (5) Replacement of missing teeth (acrylic pontic does not show in radiograph).



(2) Provide study casts mounted on the articulator of choice.

(3) If possible, secure kodachrome views of the profile and front of the face, as well as intraoral views of the teeth and soft tissues.

Study Record of Value—(1) Radiographs furnish a complete picture of the teeth, their roots, and the condition of the alveolar tissue. (2) Study casts make it possible to note tooth alignments and contacts from the lingual, labial, and buccal aspects. (3) Kodachromes furnish a record of conditions before treatment.

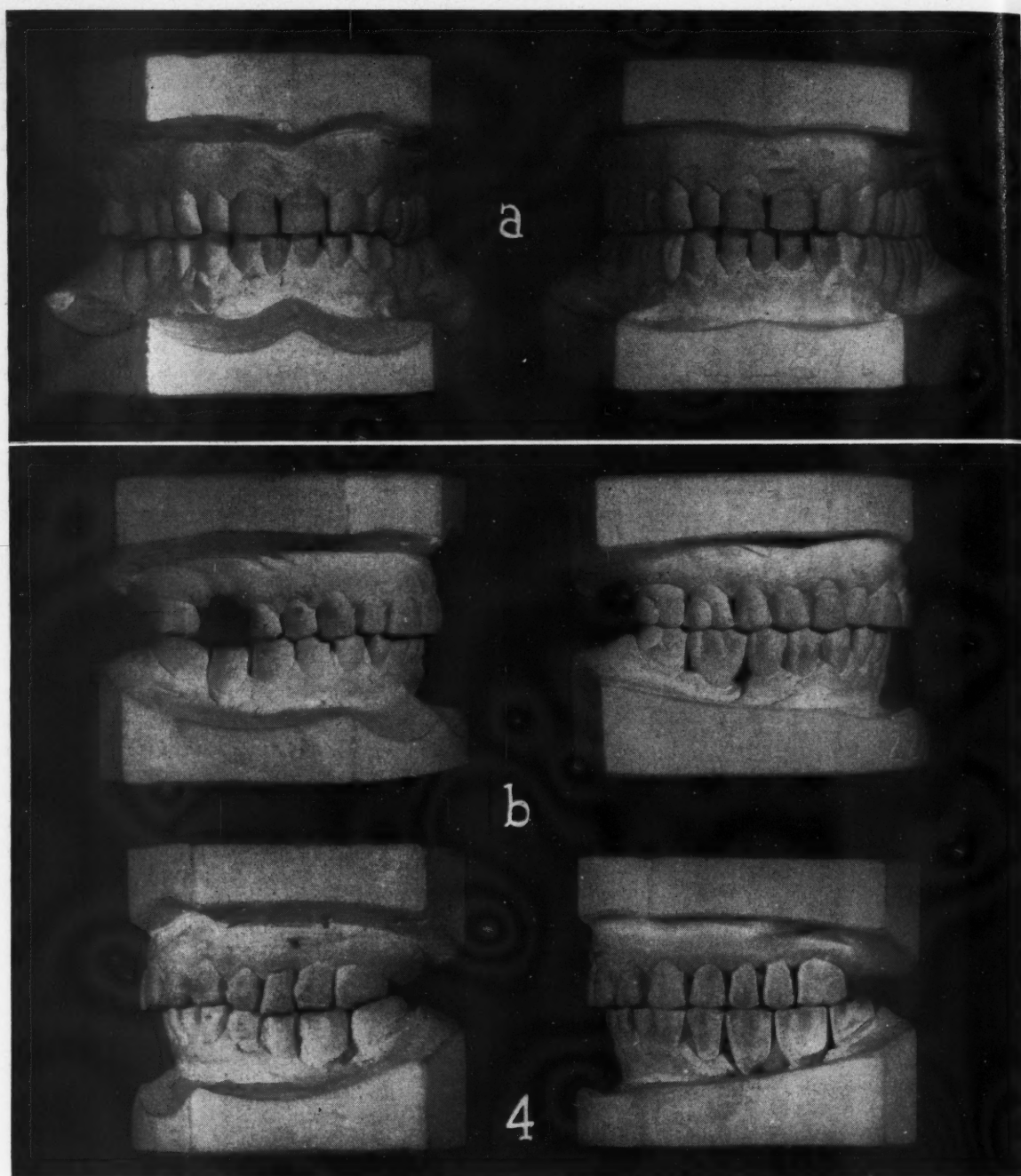
Such a record is indispensable because it will be difficult for either the operator or the patient to recall the exact appearance of the mouth before treatment.

Additional Information Useful—Data concerning (1) the patient's age and health, (2) his ability to tolerate dental procedures, (3) his attitude toward the treatment, and (4) his willingness to cooperate in all aspects of the treatment and in postoperative maintenance are of definite value.

Such information may indicate that the procedure is not suitable for a particular patient, that he is a poor risk, or that the procedure must be adjusted to suit the personality of the patient.

Treatment Involves Many Factors—Mouth rehabilitation is much more complex than treatment in general dentistry (A) because it is more extensive, and (B) because the procedures are integrated and hence cannot be terminated as readily as when a series of individual restorations, in-

3. Bitewing view of correction showing improved plane, splinting, and contact anatomy.



4A and 4B. Anterior and right and left views of the same case. This patient has been comfortable and happy for five years with the prospect of many years of dental health.

Before reconstruction, full dentures seemed to be the only possible solution.

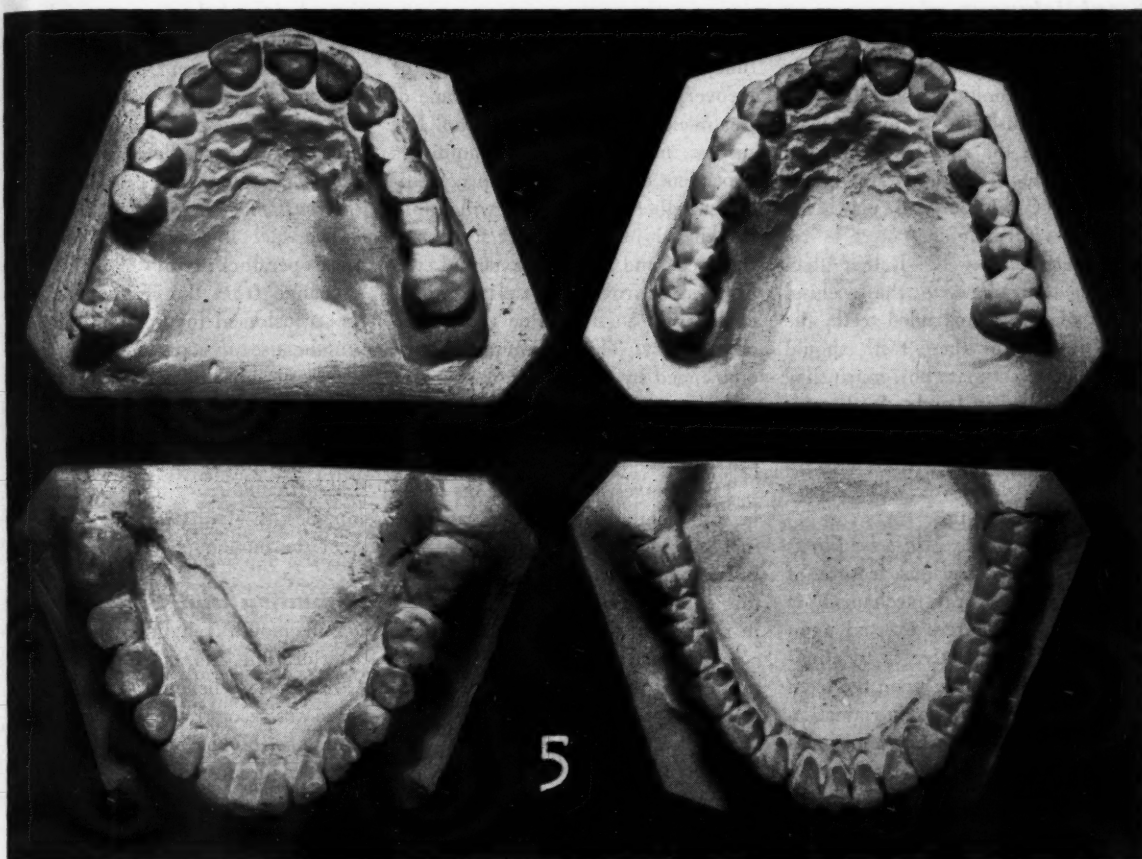
lays, or even bridges are being prepared. For example, the shortening or lengthening of one tooth involves concomitant changes in other related teeth.

Difficulties Assessed in Planning

Period—(1) A resistant personality, or uncooperativeness in a patient, (2) friction between dentist and patient, or (3) the patient's tolerance to treatment should be determined before treatment is begun.

Basic Materials Evaluated—The over-all plan includes careful consideration of the following conditions:

(1) The amount of extrusion or elongation of individual teeth.



5. Occlusal views of case before and after treatment showing improved contact anatomy, but more important, the narrowing (from buccal to lingual) of occlusal surfaces to reduce the amount of unsupported force directed against roots.

(2) The amount of tipping or inclination away from the vertical where roots are best able to support occlusal force.

(3) The size, form, and amount of root that remains embedded in the alveolus.

(4) The condition and health of the supporting structures.

(5) The degree of mobility.

After assessing the factors that led to the breakdown and evaluating the various conditions present, the dentist is ready to chart a definite plan of treatment.

Techniques

Experience with full mouth rehabilitation indicates that the following rules and procedures are basic:

Harmonious Arch Relationship

Sought—Reconstruction, like the treatment of malocclusion by orthodontics, seeks to establish harmonious arch relationship of the jaws.

Alteration of Vertical Relation—For many dentists the term full mouth rehabilitation is unfortunately synonymous with bite raising or opening. The author believes that the less the vertical relationship of the jaws is altered, the more likely will trouble be avoided. Objectives should be attained by practical compromises requiring minimum accommodation by the patient. Bilaterally balanced dentitions rarely occur in human mouths and are therefore an unnecessarily idealistic goal for reconstruction.

Splinting of Teeth an Important Measure—By the use of splints the

load is spread more evenly over more teeth and added support is given to weakened teeth. Here is one instance in which a definite guiding rule or precept can be laid down: Any mobile or tilted tooth, or any separated teeth, should be stabilized by means of splinting to a stable tooth or several stable teeth. Where bridge construction is planned, sufficient abutment strength should be provided by splinting enough teeth to give adequate support to the pontics.

Stable Replacements—All replacements of missing teeth must be made as stable as possible so that chewing will be done as readily on pontics as on the patient's own teeth. Stability can be achieved today more easily than formerly because of the more frequent use of splints.

Establishment of Occlusal Plane

Perhaps the most baffling single element in planning a reconstruction is the establishing of an occlusal plane. When the role played by the elongated tooth is understood, the problem of the occlusal plane becomes less formidable.

Problem Simplified—Rather than building the plane to the occlusal height of several extruded teeth, the pulp position of these teeth should be studied to estimate how much they can be reduced in height. With careful operating technique many extruded teeth have been reduced to shorter clinical crowns without any danger to their pulps.

Destructive Forces Must be Eliminated—The most serious feature of the deteriorated oral mechanism is excessive lateral forces exerted upon the teeth. The objective is to eliminate destructive action upon the teeth as far as possible. The introduction of a satisfactory plane of occlusion is an important factor in overcoming these destructive forces.

Compensation for Unavoidable Excessive Force—In some cases, however, for example, in deep bite cases, it is not possible to eliminate all the excessive lateral force exerted upon some of the teeth. It is wise to foresee the continuing excessive force to which these teeth will be subjected and to give them added support by splinting them to teeth less involved in this difficulty.

Ability to Prognosticate Important—Removal of injury-producing ac-

tions on the teeth sometimes results in dramatic recoveries. It is sometimes difficult to predict the extent of recovery, yet the possible outcome of treatment must be kept in mind. For success, much treatment planning is dependent on the ability to prognosticate whether mobile teeth will stabilize when injury-producing forces are removed, and to what extent. Lewis Fox² uses provisional splints which enable him to determine the degree of recovery. This technique is recommended by the author.

Uncomplicated Procedures Favored

The changes and corrections made in full mouth rehabilitation must be in harmony with the temporomandibular joint. Much of the literature on this subject discusses treatment only in relation to the use of some highly complex instrument, on the assumption that if this instrument is correctly used it will enable the operator to harmonize tooth elements with the temporomandibular joint. This has tended to make the entire subject of mouth rehabilitation appear abstruse and esoteric.

Simpler Techniques Employed—Many conscientious operators have been adding life to dentitions and improving their patients' health by simple techniques. Rather than await

²Doctor Lewis Fox of South Norwalk Connecticut, has demonstrated the use and advantages of provisional splints in several lectures and personally to the author when he visited Doctor Fox's office. Not only does this technique permit the operator to determine the amount of recovery potential; it also permits him to continue necessary periodontal treatment while the involved teeth are able to function in good anatomic relationships.

the solution of the controversial subject of temporomandibular function and the development of an ideal instrument simulating actual joint action, many operators have wisely been treating mutilated mouths by simple procedures.

Accustomed Instrument Preferred—The fact must be accepted that most operators are not likely to make a change from the instrument they are accustomed to use. For this reason the use of a particular articulator is not discussed in this article. The techniques discussed are applicable whether the operator uses the simplest form of instrument, a plane line articulator, or one presumably capable of simulating every movement the human jaw can make.

Summary and Conclusions

Full mouth rehabilitation arrests deterioration and is self-preserving. Although the benefits of this technique are recognized, it is not widely used, possibly because explicit rules of procedure cannot be formulated.

A consideration of the general principles involved and of the aim of full mouth rehabilitation offers guidance in planning and completing reconstruction. A clear understanding of the causes of deterioration in each case and proficiency in evaluating the potential results of various possible adjustments are essential.

It is the author's belief that the procedure should not be represented as so complex that the dentist will hesitate to undertake it.

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SURGERY VS. BACTERIOLOGY

in Pulpless Tooth Management

PART ONE

PHILLIP M. CHERNOFF, D.D.S., Middletown, Conn.

DIGEST

Advancement in scientific fields is attended by a process of experimentation in which principles shown to be of merit are adopted and those proved worthless are discarded. In this article, which is a series of four, a survey is made of the history of the treatment of pulpless teeth based on bacteriologic principles, an approach that in the author's opinion has not been successful. The use of apicoectomy, which is described as a conservative rather than a radical measure, is advocated and reasons are set forth in favor of general adoption by dentists of this procedure.

Introduction of Bacteriologic Concept

According to Anthony and Grossman¹ attention was first called to bacteriologic examination of the root canal before filling the canal in 1901 by T. W. Onderdonk, of New York. It would seem, however, that the procedure was little used until 1919 when Coolidge re-introduced it.

Since then dentists have been applying the bacteriologic concept in the management of the pulpless tooth. Much has been written describing techniques, smears and cultures, and presenting innumerable statistical summaries of bacteriologic studies.

Application of the Principle—Bacteriologists are respected in the dental profession, but the result of applying bacteriologic principles to pulpless tooth therapy for thirty years is an

accumulation of proof that the problem of the pulpless tooth cannot be solved by the bacteriologic approach. The theory that was new thirty years ago has been thoroughly tested, has been found unsatisfactory, and should be discarded in favor of an effective procedure.

Uncertainty in Prognosis—The record of final results with the popular methods of treating pulpless teeth (the aseptic and the antiseptic) prevents the dentist from undertaking such treatments with the confidence that a man skilled in a special technique should possess. Treatment of pulpless teeth is usually approached with hope but uncertainty as to the outcome; this is indicated by the common practice of insisting on periodic check-up radiographs for many years after completion of treatment.

Sources of Confusion

Morse and Yates² make the following statement: "One of the most interesting observations was the number of cases that were always negative, giving no positive results at any time during the course of treatment. Seventy-seven of the two hundred and sixty-five, or 29 per cent, gave no positive culture. When we have assumed the presence of bacterial infection in the root canal cases that we accept for treatment it is somewhat surprising and perhaps puzzling to find no pathogenic organisms present in such a large percentage of cases. For example, in the group of cases classified under 'Circumscribed ra-

diolucency,' out of a total of fifty-nine cases thirty-one showed no microorganisms present in the canal." (Fig. 1).

Bacteriologic Evidence not Dependable—The term, "circumscribed radiolucency," is the radiographic evidence of periapical bone destruction, the usual clinical meaning of which is commonly known. The bewilderment of the bacteriologist when "no pathogenic organisms are present in such a large percentage of cases," is therefore understandable. It is obvious, however, that in root canal therapy bacteriologic findings cannot be depended on as a guide.

Conflicting Statements—According to Rosen,³ "Bacteriologic examination will determine primarily when a canal is ready for filling.

"However, although the bacteriologic examination of root canals will serve as a valuable guide, as well as lead the operator to preserve a sterile technique, it is still debatable whether absolute sterility is possible or necessary before a canal may be filled."

Comment—If it is not possible or necessary to attain "absolute sterility" before a canal may be filled, how can the contradictory statement that "bacteriologic examination will determine primarily when a canal is ready for filling" be justified?

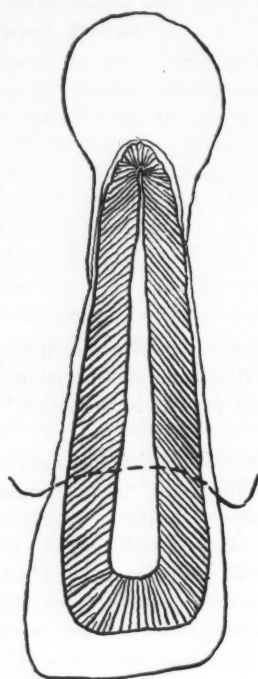
In the following statement Rosen definitely suggests that sterility is not a requisite before filling a canal: "As Cahn⁴ states: 'Surgeons do not wait for negative cultures until they close a wound. If they did, most patients after a laparotomy would be lying around with their entrails hanging out.'"

¹Rosen, Norman: Root-Canal Therapy and the Use of Sulfonamides, J.A.D.A. 31:625 (May) 1944.

²Cahn, L. R.: Study of Periapical Pathology: Its Influence on Pulp-Canal Therapy, New York J. Dent. 12:329 (Oct.) 1942.

³Anthony, L. Pierce, and Grossman, Louis I.: History of Root-Canal Therapy, J.A.D.A. 32:47 (Jan.) 1945.

⁴Morse, F. W., and Yates, M. F.: Follow-up Studies of Root Filled Teeth in Relation to Bacteriologic Findings, J.A.D.A. 28:956 (June) 1941.



1. Circumscribed radiolucency.

Indications of the Presence of Infection

Grossman⁵ states that "The *raison d'être* for a bacteriologic examination is ably discussed by Appleton who points out that 'if the function of root-canal therapy is to render the canal and periapical tissues sterile, the only

⁵Grossman, Louis I.: Bacteriologic Examination of Pulpless Teeth Before Filling Root Canals, J.A.D.A. and Dental Cosmos 25:774 (May) 1938.

method which can determine whether that objective has been attained is a bacteriologic examination.'

"The two methods for determining the bacteriologic status of a pulpless tooth are (1) the smear, and (2) the culture."

Grossman continues: "If bacteria are present, they will be seen as small coccal forms, either singly or grouped in chains, sometimes in clusters. Rod forms may at times also be seen. These findings indicate that sterility has not yet been attained and treatment should be continued.

"If many pus cells (leukocytes) are seen, either with or without bacteria, it is an indication that infection is still present and treatment should be continued. An occasional pus cell is not significant.

"In the absence of bacteria or a large number of pus cells the root canal may be considered potentially sterile and ready for check-up with a culture."

Comment—That the presence of pus cells in any number is an indication of infection is common knowledge. A large number of pus cells or a small number of pus cells may be indicative of the quality of the defensive mechanism in the blood. Certainly the presence of a small number of pus cells is not justification "to consider the root canal potentially sterile."

Taking the Culture—Grossman includes the following statement: "A fresh sterile absorbent point is inserted to the apex of the tooth and allowed to remain there for a minute. It is then removed and, if its tip is moist, is dropped into a tube of culture medium. If the absorbent point comes out dry, a drop or two of culture medium is carried into the canal, with precautions for sterility, to supply the needed moisture."

Bacteriologic Examination Fallacious—The phrase "If the absorbent point comes out dry" is more important than Grossman supposed. It exposes the fallacy of making a bacteriologic examination of the root canal in the management of pulpless teeth.

Comparison of Experiences—The experience described by Grossman "if the absorbent point comes out dry"

may be compared with the experience of Morse and Yates in which thirty-one bacteriologically negative root canals were found in a group of fifty-nine cases of infection with "circumscribed radiolucency."

Discussion—Obviously the foramina in these cases were clogged and obstructed so that there could be no drainage from the periapical area into the canal; therefore the absorbent point is dry. That is why the thirty-one canals were bacteriologically negative while the clinical condition was definitely one of destructive periapical infection (Fig. 2).

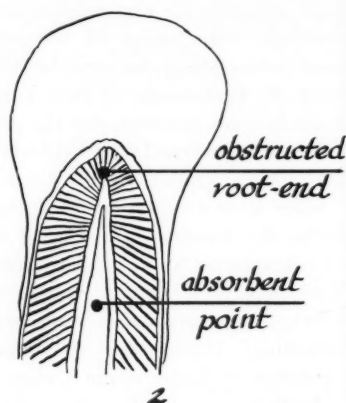
These are but two of the clinical experiences that prove that no bacteriologic examination of a root canal gives a true picture of the condition existing in the periapical area.

Periapical Area Chief Concern

The health of the periapical area, not that of the root canal, should be the dentist's first concern. To a great extent out-of-date terminology is responsible for the continued adherence to the old misconception.

Change in Terminology Advised—In an article in the December 1940 issue of DENTAL DIGEST⁶ the author suggested that the management of

⁶Chernoff, P. M.: A New Concept Regarding Apicoectomy, DENTAL DIGEST 46:415 (Dec.) 1940.



2. Schematic cross-section of the apical end of the root illustrating how calcification and obstruction of the apex may permit a root canal to be dry in cases of periapical circumscribed radiolucency.



3. (A) A well-condensed canal filling, obviously with great pressure, yet failing to penetrate to the apex. An absorbent point in such obstructed canals is of no value in bacteriologic diagnosis. (B) The same case after apicoectomy, showing complete regeneration.

pulpless teeth should be referred to as "periapical therapy," rather than as "root canal" therapy as an aid to bring about a better conception of the problem. Infection must be eliminated from the periapical area and the root canal sealed to prevent reinfection.

Attention Should be Focused on the Periapical Region—A root canal is actually no more than a corridor leading to the periapical area; it is the condition of the periapical area that determines success or failure of treatment.

Periapical Sterility the Objective of Treatment—A bacteriologic examination is misdirected when it is limited to the root canal; a bacteriologic examination should be made of the periapical area or not at all. Periapical sterility should be the objective of treatment, not root canal sterility (Figs. 3 and 4).

Problem is Concerned with Bone Condition—Infection in pulpless cases manifests itself at the apex and its surrounding tissues. The problem becomes one of bone condition and not one of tooth condition. When this truth is universally accepted, dentistry will begin to make progress in the management of the pulpless tooth.

High Percentage of Error in Bac-

teriologic Findings—In 1938 Auerbach⁷ stated that "there exists a great deal of evidence that bacteriologic findings present a high percentage of error. The cultivation of organisms from live pulps of normal, x-ray negative teeth and the lack of correlation between bacteriologic, histologic, and pathologic pictures, as pointed out by Hatton and others, indicate that we should hesitate before basing conclusions on this type of study. To date, no method has been advised to secure a culture from the apex of a tooth without contamination by oral tissues and oral fluids."

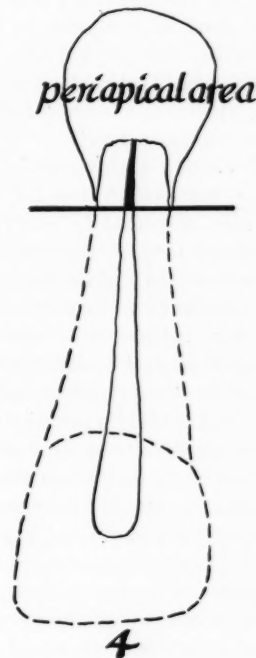
Classification of Microorganisms Important—Filgueiras⁸ reports the following: "The test for sterility of root canals by bacteriologic cultures should consist in not only demonstration of a growth or lack of growth of microorganisms in the culture medium, but also a microscopic examination to determine the type of microorganisms that may be growing in the culture. It is important to know whether the microorganisms are saprophytic or pathogenic. Streptococci

and staphylococci are usually considered pathogenic when found in root canals while *Micrococcus catarrhalis*, diphtheroids, and *Bacillus subtilis* are saprophytic microorganisms that frequently are found in the culture. The presence of these saprophytes usually indicates contamination from an improper technique, such as a leak in the rubber dam or careless use of a disinfecting wash of the teeth included in the rubber dam, or possibly an accidental contamination in some part of the operation in inoculating the culture medium or of studying it in the laboratory."

It would seem that Filgueiras cannot conceive of saprophytes being harbored in an infected pulp canal and believes their presence in the culture medium usually indicates contamination.

Contrary Opinion—Crane⁹ comments: "While a foul odor is said to be indicative of saprophytic activity,

⁹Crane, A. B.: Diagnosis Preceding Root Canal Treatment, J.A.D.A. 15:237 (Feb.) 1928.



4. The periapical area is the seat of the pulpless tooth problem, not the root canal. If the resected root is sealed after periapical curettage, the rest of the root canal is relatively unimportant. Treatment should be designated "periapical therapy" rather than "root canal therapy."

⁷Auerbach, M. B.: Clinical Approach to the Problem of Pulp-Canal Therapy, J.A.D.A. and Dental Cosmos 25:939 (June) 1938.

⁸Filgueiras, J.: Importance of Bacteriologic Tests in Root-Canal Therapy, J.A.D.A. 29:2211 (Dec.) 1942.

it is evident that a continued foul odor after the canal is cleansed is indicative of deep infection of the dentinal tubules."

These divergent opinions are characteristic of the confusion created in the field of pulpless tooth management by bacteriologists.

Sterility Does Not Mean Cure— Filgueiras states "the culture test is necessary to prove the sterility of the canal . . . A sterility test of a root canal, therefore, must be made systematically in all cases. This proof, like all laboratory proof (Wasserman, Kahn, Schick, Hemoculture) when negative, may have no value at all. It should be made plain that sterility does not mean cure."

This statement would seem to indicate a doctrine of futility.

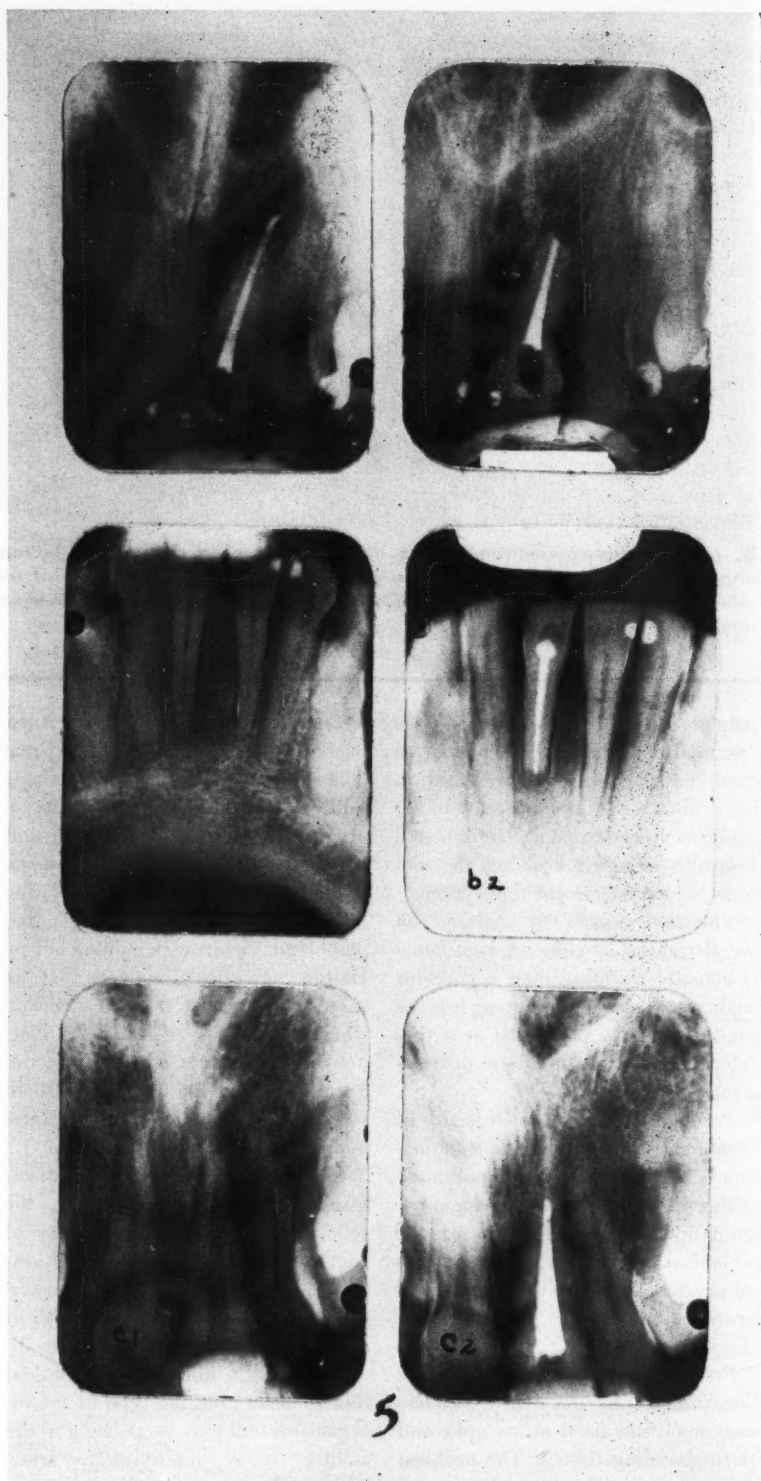
Surgical Approach Advocated

The author,¹⁰ who advocated the surgical approach to the problem of the pulpless tooth ten years ago, still firmly believes this is the most satisfactory form of treatment. In literature dealing with pulpless teeth, however, the term "root canal surgery" is usually applied to a technique of medication, without surgery.

Apicoectomy a Conservative Procedure—Apicoectomy has for many years been advocated for every anterior pulpless tooth by the author who has demonstrated that the factors formerly considered to be contraindications for apicoectomy were not founded on clinical results. Contraindications in this procedure had formerly been unduly restrictive. The teaching of apicoectomy also had been so radical as to discourage its wide acceptance by dentists. Apicoectomy is a conservative procedure, however, that will consistently produce successful results. Had the subject been properly taught, the unnecessary sacrifice of countless teeth would have been prevented.

Effort to Correct False Teaching— The following is a published statement of the author:¹⁰ "The extent of bone destruction about the apex or along the root crown-wise does not

¹⁰Chernoff, P. M.: The Surgical Treatment of the Pulpless Anterior Tooth, Bull. Connecticut D. A. 17:29-43 (Nov.) 1940.



5. Cases showing extensive involvement of roots in which resection of only the critical end resulted in regeneration of bone, cementum, and the periodontal membrane.

have any bearing whatsoever upon the success of an apicoectomy. Resection need not be done at the limit of root involvement, but only enough of the apical end of the root need be removed to eliminate the 'critical end.' Whatever the extent of the root involvement, the surrounding bone will regenerate and the area will entirely fill in, once the cause and consequences have been removed. If the offending apex has been removed and the periapical area has been thoroughly cleansed and curetted, there is every reason to expect regenerative activity of the bone, of the cementum and of the periodontal membrane."

Apicoectomies Followed by Complete Regeneration of Tissue—Many apicoectomies performed by the author in cases of extensive periapical bone destruction, involving more than half the root length, in which resec-

tion of only about 2 millimeters of the apical end have been followed by complete regeneration of all periapical and periradicular tissues (Fig. 5).

Use of Drugs—Surgery in these cases is certain of success whereas the failure of drugs, scores of which have been tried, is well known. Of penicillin, for example, which has proved inefficacious in treatment in these cases, Fish¹¹ states: "An attempt was made by Shaw, Sprawson and May to sterilize the infected root canal with penicillin. In only one case out of twenty were they able to get negative bacterial swabs, and in that case only after seven dressings. Indeed, they assert that eleven out of the twenty cases were infected with organisms resistant to penicillin."

¹¹Fish, E. W.: Penicillin in Dental and Oral Surgery, J.A.D.A. 33:987 (Aug.) 1946.

Conclusion

1. The bacteriologic principle in the treatment of pulpless teeth has been thoroughly tested for thirty years and has proved impracticable in application. Failure of the principle in practice should be recognized.

2. In answer to the protest that surgical intervention in pulpless tooth management is radical procedure, the difference in tissue reaction to various methods of treatment is pointed out. Treatment by medication and reliance on bacteriologic examination frequently initiates a process of degeneration; whereas, following apicoectomy, the process of periapical tissue activity is one of regeneration. A procedure that initiates a process of repair should be considered a conservative method of treatment.

154 Broad Street.

Mechanism of Cariostatic Action

THE EFFECTIVENESS of small amounts of fluoride in decreasing the incidence and extension of dental caries is now well established, at least in young persons who have not obtained full growth. However, the mechanism by which the cariostatic action of fluoride is produced is not yet completely understood. There are two main viewpoints: One is that fluoride decreases the solubility of the enamel in an acid medium, and another is that fluoride inhibits the growth of the acid-forming organisms in the mouth and thus indirectly decreases acid erosion.

The former view was originally based on the observation that powdered enamel or dentine from human teeth became much more resistant to dissolution in acid (pH 4) if it was first treated with sodium fluoride. A number of subsequent investigations have confirmed this claim.

The view that fluoride produces its cariostatic effect by inhibiting the growth of the acid-producing micro-

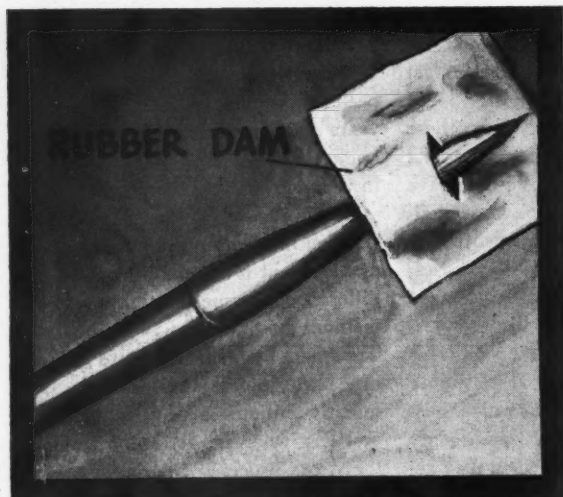
flora of the oral cavity was supported by the results of a comparison of the acidophilus counts in the mouths of children living in Kingston, N.Y. where the drinking water contains almost no fluoride, with those of children in nearby Newburgh, where fluoride had been added to a concentration of one part per million. The acidophilus counts were consistently lower in the mouths of the Newburgh children. These observations have not been consistently confirmed.

Recent study has demonstrated that topical application of sodium fluoride to the teeth of college students at weekly intervals for four weeks resulted in no statistically significant decrease in the acid-producing oral flora as compared with nonfluoride treated controls. These investigators conclude that their results do not support the "enzyme-inhibitor" explanation of the cariostatic effect of fluoride.

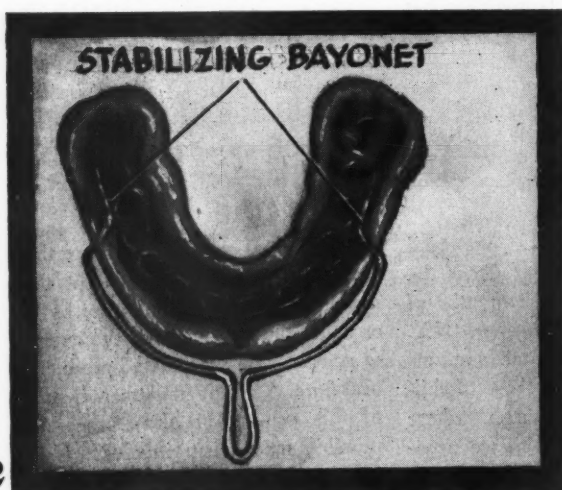
The current available evidence thus strengthens the earlier concept that fluoride decreases dental caries by increasing the resistance of the enamel to acid erosion by the acid-producing oral flora. A recent fundamental study of this general problem suggests a possible mechanism involved. Using isotope exchange and ion competition techniques it was found that fluoride can replace hydroxyl or bicarbonate ions on the surface of bone, thus forming a highly insoluble, resistant "fluoroapatite." Presumably the same phenomenon occurs in the mouth. Fluoride from drinking water is adsorbed or exchanged for another ion on the enamel of the tooth, thus forming the more acid-resistant fluoroapatite. This may explain the cariostatic action of fluoride.

Adapted from Editorials and Comments, *Journal of the American Medical Association* 150:1120-1121 (Nov. 15) 1952.

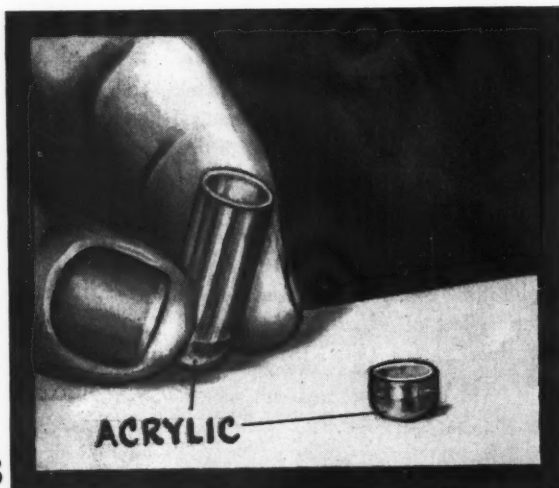
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2



3



Clinical and Laboratory

Care of Camel's-hair and Sable Brushes

S. A. Allen, D.D.S., Santa Susana, Calif.

1. Brushes that are used in the Nealon technique should be kept pointed. Cut a piece of rubber dam the size of a postage stamp and punch a small hole in the center with the rubber dam punch. Pull the rubber over the handle and stop about the middle of the bristles.

"Bisquit" Bite Stabilizer

Charles B. Branson, D.D.S., Lincoln, Neb.

2. The tendency of a soft beeswax "Bisquit" bite is to distort laterally. To overcome this tendency the bite may be stabilized with a bayonet-shaped wire reinforcement made from a coat hanger or from 10-gauge copper wire. The wire should be flattened on the sides.

Preventing Amalgam Sticking in Metal Capsules

Sanford M. Bingham, D.M.D., Provo, Utah

3. When a mechanical amalgamator is used, the soft mix may stick in the ends of the metal capsules. To prevent this, fill the bottom of the metal capsule and the top of the cap with fast setting acrylic powder. Then add monomer. Allow to set. The amalgam mix will not stick to plastic as easily as it does to metal.

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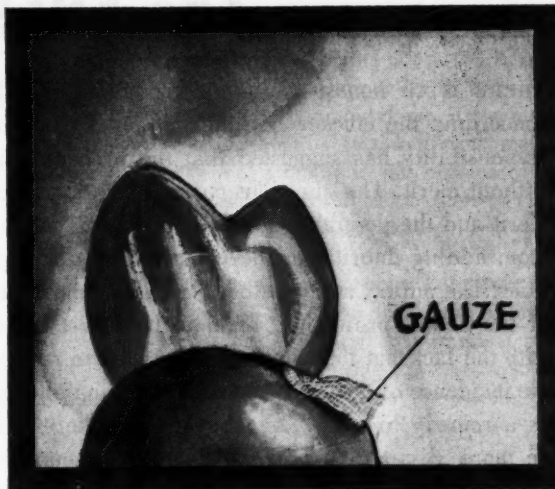
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SUGGESTIONS . . .

Reduction of Hypertrophied Tissue

Edward Bressman, D.D.S., Irvington, N.J.

4. If gingival tissue under an acrylic or porcelain pontic has become hypertrophied, cut a piece of plain or iodoform gauze the width of the pontic and slide underneath the pontic. Allow to remain in position 24 to 48 hours and the hypertrophy will be reduced.



4

Removing Excess Plastic From Teeth

Hardy F. Pool, D.D.S., Mason City, Iowa

5. Before the preparation of the cavity (if the rubber dam is used, after placement of the dam), paint all surfaces of the tooth and adjacent teeth with liquid "MODERN FOIL." Allow to dry. Excess plastic is easily removed from surfaces that have been covered with this preparation.

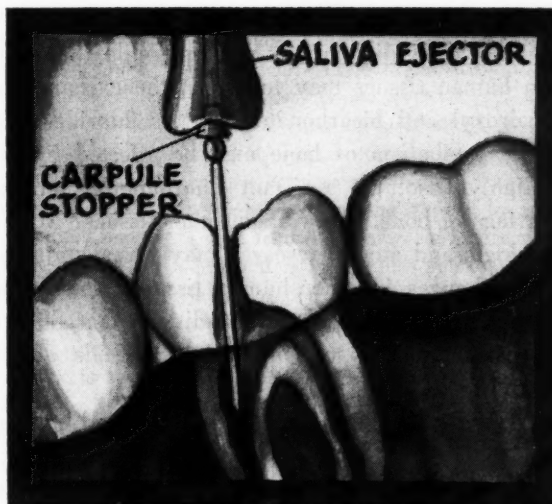


5

Drying Root Canals

Robert L. Joseph, D.D.S., Linden, N.J.

6. Put a rubber stopper from an anesthetic tube in the saliva ejector. Insert a needle through the rubber stopper. When the needle is placed in the root canal, the suction from the ejector will remove debris and dry the canal.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 38 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S Page

THERE IS an honest doubt among some dentists concerning the efficacy of fluoridation. No one of responsibility has suggested that the procedure is without merit. The questions concern the degree of merit and the possible bodily harm that may come from adding fluoride to the communal water supplies. The public, and possibly the zealous members of the dental profession, seem to have lost touch with the fact that fluoridation is intended to *reduce* the incidence of dental caries. It is not being offered as a remedy to *eliminate* tooth decay. There will be many disappointed people in the communities where fluoride has been added to the water supply when they learn that they and their children still suffer from caries.

No one at this point understands exactly the cariostatic action of fluoride. According to the *Journal of the American Medical Association*:¹ "The current available evidence strengthens the earlier concept that fluoride decreases dental caries but increases the resistance of the enamel to acid erosion by the acid-producing oral flora. A recent fundamental study of this general problem suggests a possible mechanism involved. Using isotope exchange and ion competition techniques, the University of Rochester investigators found that fluoride can replace hydroxyl and bicarbonate ions on the surface of bone, thus forming a highly insoluble, resistant 'fluoroapatite.' Presumably the same phenomenon occurs in the mouth. Fluoride from drinking water is adsorbed or exchanged for another ion on the enamel of the tooth, thus forming the more acid-resistant fluoroapatite. This may explain the cariostatic action of fluoride."

The JAMA did not say what possible ill effects on human tissues may follow in the exchange of hydroxyl and bicarbonate ions for fluoride ions. The metabolism of bone may be affected by the "highly insoluble resistant fluoroapatite on the surface of bone." How about other tissues? Microbiologic and atomic research may reveal unfavorable changes in other human tissues, when techniques are better refined; conditions that do not reveal themselves under present methods of research.

An editorial in another medical journal empha-

sizes a point that we should not ignore in our interest in fluoridation. Says the *British Medical Journal*:² "The great advances in dental surgery and anesthesia during this century have made young people today accept regular dental treatment as part of their ordinary lives. Consequently, they tend to rely on their dentist for the care of their teeth and not upon any efforts of their own." How true! Every dentist who has struggled with children and with their parents to, reduce the intake of fermentable carbohydrates recognizes that patients are disinclined to accept this advice. Patients often express themselves in words of poor concealment when they lament that they still have tooth decay despite the fact that they see their dentist twice a year and brush their teeth twice a day. *Dentists cannot prevent tooth decay.* The best that we can do is to give dietary and hygienic advice and ask the patient to see us frequently so that we may detect and treat the carious lesion in its early stages. Dental caries being a progressive disease and dental hard tissue possessing no power of repair, our advice for early detection and early treatment is the best that we have to offer. Fluoridation of communal water supplies does not nullify this advice.

The *British Medical Journal* editorial also says "people have grown used to preventive medicine exercising its powers by rapid and simple means, and have for long taken for granted that the public health authorities will protect them from sanitary and environmental hazards without much personal interference. But for a man to change his dietetic way of life is another matter, and only a few seem prepared to undertake this either for themselves or for their children."

Dentists in the communities where fluoridation of the water supply has been a furiously debated subject should not be overcome with consternation if they find that their patients have begun to place their reliance on the much promised drug in the drinking water and have withdrawn their faith from periodic dental examinations, personal oral hygiene, and dietary control. Millions of people are going to be angry at somebody (and the dentist is the closest one at hand) when they learn that fluoridation was never intended to *eliminate* tooth decay. Its purpose is to *reduce* the caries incidence. We have not made this point clear to the public.

¹Editorials and Comments, Mechanism of Cariostatic Action of Fluoride, J.A.M.A. 150:1120-1121 (Nov. 15) 1952.

²Editorials, Rotten Teeth, Br. M. J. No. 4790:928-929 (Oct. 25) 1952.



Nail Shapes

The shape of the nails is a doubtful aid in diagnosis. In most cases, the shapes are hereditary phenomena.

The nail accompanying the short wide racket thumb, formerly thought to be a minor sign of congenital syphilis, is probably only a hereditary phenomenon. The racket nail is uncommon, but not rare, and apparently unrelated to any external or internal pathologic condition. Either one or both thumbnails may be involved. More than twice as many women as men are affected. Short and wide big toes or toenails have not been observed.

Trauma or heredity may be the cause of the deep single longitudinal groove which appears in the middle or lateral side of a nail. Longitudinal fissuring probably belongs to the same group.

Longitudinal fissures of the nail are usually represented by slightly raised, continuous, or interrupted straight parallel longitudinal lines. Histologically, the ridges correspond to projections of the nail bed of the fingers or toes and are probably only a sign of senescence, being common after middle age.

Transverse furrows (Beau's lines) are common nail anomalies, the result of some unknown action on the matrix. Trauma from work or from manicuring, picking or biting seems to be a predisposing factor. The nail matrix may have a hereditary predisposition to react to stimuli by formation of waves or canals or ridges, while the same stimuli does not affect the matrix of nonpredisposed persons.

The importance of transverse furrows as an early sign of cardiac infarction, intermittent claudication, and trichinosis is based on isolated instances and no generalization can be drawn. However, subungual hemorrhages are widely accepted as a valuable sign in subacute bacterial endocarditis.

Clubbing of the fingers is the most investigated nail and finger tip anomaly and is undoubtedly of some value in disorders of the respiratory and

M E D I C I N E

and the

Biologic

Sciences



cardiac apparatus. However, the condition also may be a hereditary phenomenon.

Ronchese, F.: *Anomalies of the Nail*, *Arch. Dermat. & Syph.* 63:565-580 (October) 1951.



Transmission of Poliomyelitis Virus

The organisms of poliomyelitis are transmitted by various methods, one or several of which may predominate under certain circumstances. The main source of poliomyelitis is stool-borne virus from patients and healthy carriers. Droplets from the nose and mouth are less important as sources.

There are four simple rules for protection to observe during epidemics: (1) Keep fingers out of mouth, and wash the hands before eating. (2) Keep flies away from all food and thoroughly wash whatever is to be eaten uncooked, such as fruits and vegetables. (3) Keep children under 16 years of age out of crowded public wading and swimming pools.

Oropharyngeal and anal washings endanger swimming pools. (4) Avoid intimate association, including hand shaking, kissing, and use of common eating utensils or towels, with members of a family in which poliomyelitis has occurred within three weeks, even if the patient has been removed to the hospital.

The alimentary tract is the only region of the body outside the central nervous system where virus is regularly found. During the first week of illness, organisms may be detected in the throat in a small proportion of cases.

The virus is seldom recovered from the nose. Respiratory spray and naturally expectorated saliva do not ordinarily contaminate the outer environment.

Poliomyelitis virus can be obtained from feces in the first week after onset in 70 to 90 per cent of instances. Even by the third and fourth weeks, stools may be a source of infection in 50 per cent of frank, slight, and subclinical cases.

A limited series of infections in a family or small community may be started by a single source, not necessarily human. Most members of an involved family become ill about the same time, as if from the same food or drink.

Eighty to 90 per cent of cases in temperate zones occur in the fly season of late summer and early autumn. Green-bottle and blow flies are attracted to both human feces and common foods. The virus is repeatedly discovered in flies during outbreaks of poliomyelitis. After artificial infection, the insects excrete organisms for as long as twenty-one days.

By the time an epidemic is recognized in a large community so many healthy carriers are involved that dissemination cannot be stopped by any single method. Wholesale emergency destruction of filth flies and total isolation of patients are scarcely worth while.

Elementary rules of hygiene may be adopted without fear that natural immunization will be delayed to a less favorable age. In the years between epidemics subclinical infection continues, and strains of greater virulence

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are probably circulating when disease is widespread.

Sabin, Albert: *Transmission of Poliomyelitis Virus*, J. *Pediat.* 39:519-531 (August) 1951.



Iron Metabolism

Of all the anemias iron deficiency anemia is the most common. It has been estimated that between 5 and 25 per cent of the population of the United States and Great Britain have evidence of iron deficiency.

The clinical manifestations of iron deficiency anemia include the well-recognized symptoms common to any anemia: (1) weakness, (2) easy fatigability, (3) pallor, (4) palpitation, and (5) dyspnea on exertion. Less frequently recognized are: (1) dysphagia, (2) superficial glossitis, (3) "spooning" and brittleness of the nails, and (4) angular fissures of the mouth indistinguishable from vitamin deficiency. All of these symptoms may respond to iron therapy alone.

The total amount of iron in the body is between 3 and 5 grams. The greatest percentage of this iron, 65 to 75 per cent, is in combination with porphyrin in the form of heme compounds. These include the following: (1) blood hemoglobin (60 to 70 per cent of the total body iron), (2) muscle hemoglobin or myoglobin, and (3) the various heme enzymes which include catalase, peroxidase, and the cytochromes. The chief function of these heme compounds is to make oxygen available to the cell.

Iron is absorbed in the ferrous form. The acid in the normal stomach serves to convert the colloidal ferric hydroxide of food to monomolecularly dispersed ferric ions. At acid pH certain substances in the food serve to reduce the ferric ions to the ferrous form. This ferrous iron is absorbed chiefly in the duodenal region where the reducing substances continue to operate. Apparently the rest of the gastrointestinal tract has the capacity to absorb iron if the iron is still in the ferrous form.

The amount of iron absorbed is regulated by the amount of ferritin in the mucosal cells of the intestinal wall. This in turn is related to the need for iron in the body. Normally very little iron is absorbed even when administered in large doses. However, in the presence of chronic iron deficiency, the iron is absorbed in an amount five to twenty times the amount absorbed by normal persons.

Following absorption the iron is transported through the blood stream to the tissue stores, chiefly the liver, the spleen, and the bone marrow in combination with the serum protein. In this form the iron is known as the serum iron. In general, the serum iron indicates the level of iron available for hemoglobin production.

The serum iron is low when iron deficiency exists and during acute and chronic infection. It may also be reduced in other conditions in which the iron is deviated into storage depots.

It has been demonstrated that once iron has gained access to the body it cannot get out. The iron con-

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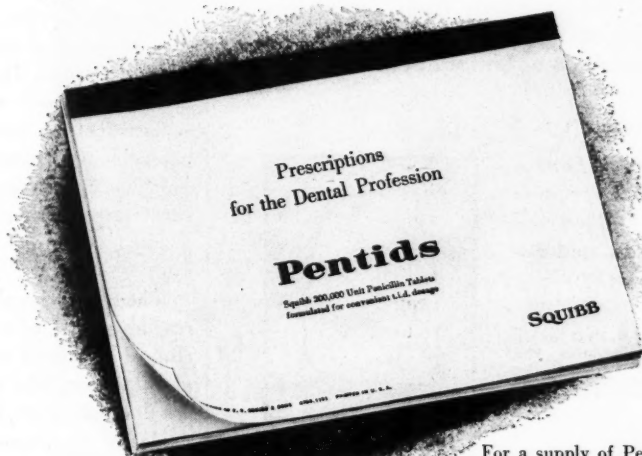
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1. Keefer, C. S., Postgrad. Med. 9:101, Feb. 1951

2. Flippin, H. F., and Israel, H. L., Med. Clin. North Amer. 34:1653, Nov. 1950



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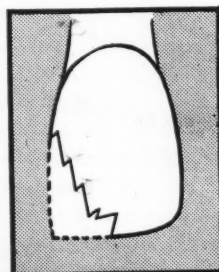
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P. F. IS NOT another acrylic or resin filling material. It is 1½ times denser than acrylic, insoluble in mouth fluids, HCl, NaOH, Acetone, etc. Does not stick to chewing gum.

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P. F. is in every sense a permanent, esthetic, posterior filling. It comes in a complete shade range, and is the only filling you can build up incisal corners with, and dismiss the patient with confidence.

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tained in the hemoglobin of circulating red cells, which makes up about three-fourths of the total body iron, is quantitatively re-utilized as the red cells complete their normal "life span" of 100 to 120 days and are removed from circulation.

Chronic blood loss is the most frequent cause of iron deficiency. Before the deficiency can be permanently treated it is important to locate the blood loss and take steps to correct it.

Rath, Charles E.: Current Concepts of the Metabolism of Iron and Its Use in the Treatment of Anemia, M. Clin. North America 34:1779-1789 (November) 1950.



Hypothyroidism in the Aged

Hypothyroidism is far more prevalent in the elderly than is generally realized. It is important to detect the disorder as correction of such a deficiency, even though mild, restores the aging individual's zest for living, increases his productivity and will probably retard degenerative processes.

Occasionally the disease is the result of surgical or medical attack upon the gland. However, the vast majority of cases are caused by the replacement of functioning thyroid parenchyma by connective tissue cells. This slowly progressive, clinically silent degeneration is followed by a gradual reduction of the metabolic rate.

When the basal metabolic rate reaches a level of minus 20 per cent, clinical evidences and myxedema usually appear. The earliest symptoms are due mainly to deceleration of the oxidative processes and consist of diminished tolerance to cold, mental sluggishness, and a lack of physical energy. The earliest symptoms of the impairment are the following: (1) physical and mental fatigue, (2) chilliness, (3) decreased sweating, and (4) sometimes a moderate weight gain. Too often these vague symptoms are attributed to age by both the patient and physician.

Mild and moderate hypothyroidism are not accompanied by the picture of

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classical myxedema. The basal metabolic rate is the only physiologic constant known to change appreciably with aging. However, there appear to be such wide variations that a great deal of study is still needed to understand the changes.

Hypothyroidism develops so insiduously that the victim is often unaware of his disease. He admits his symptoms on being carefully questioned but frequently fails to com-

plain of them voluntarily. They may be dismissed as minor nuisances, for the mental slowness characteristic of the disease impairs the power of self-awareness and self-criticism.

Diagnosis may be difficult in the older age groups since many manifestations of thyroid deficiency are popularly considered an integral part of normal senescence and since they are modified by the general metabolic changes of old age. Laboratory data

are not entirely reliable. Proof of the presence of hypothyroidism may have to rest upon the amelioration of the patient's complaints, and the disappearance of physical signs following replacement therapy.

It appears that correcting hypothyroidism in the elderly retards senile degeneration. Some clinicians feel that there is a definite relationship between the thyroid gland and the development of medial arteriosclerosis in man. Cardiac competence is definitely impaired by hypothyroidism.

Therapeutic success depends upon the following: (1) accurate diagnosis, (2) the employment of a small initial dose, and (3) the avoidance of over-medication. Sudden stimulation is poorly tolerated by the elderly individual whose heart and other vital organs have gradually adapted over a long period of time to a subnormal level of activity. Therefore, the initial dose should not exceed one-half to one grain daily. Since the effect of desiccated thyroid increases gradually to a maximum in approximately three weeks, subsequent basal metabolism tests and changes in dosage should be spaced at intervals of at least one month.

Kimble, Sreuch T., and Stieglitz, Edward J.: *Hypothyroidism: A Geriatric Problem*, *Geriatrics* 7:20-31 (January-February) 1952.



Reading Difficulty

Each year there are approximately 2,000,000 new pupils in the United States. Of these, nearly 300,000 fail for lack of reading skill. Boys are more frequently affected and failure may occur for this reason in pupils with a high intelligence quotient.

When flash methods of teaching have been used alone, three times as many cases have resulted as when phonetic instruction has been employed. For most children the more rapid techniques are excellent. However, some must learn by more dependable methods.

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write capital and small letters. Too much emphasis on speed may create a subconscious sense of defeat and conflict, and can produce inability to read.

The most experienced, most intelligent, and highest paid teachers should teach in the primary grades rather than those with least experience, as is now the practice in many places. Emotional problems may be a factor in dyslexia, but many problem children have improved in behavior when reading difficulty has been cured.

Dyslexia appears to be commoner in persons with mixed cerebral dominance, that is, persons who are lefthanded with a dominant right eye or vice versa. Confusion can be demonstrated clinically in these cases. Often the ophthalmologist is consulted because it is assumed that eye disturbances are factors in dyslexia. However, phorias occur with equal frequency in good and poor readers. There is a possible relation between dyslexia and a low amplitude of fusion or weak power of convergence.

Not all children can be taught by

so-called "progressive methods." When difficulty is incipient or well established, teaching must begin with the most elementary work regardless of the school grade. This teaching includes (1) fundamentals of syllable formation, (2) word structure, (3) word analysis, (4) phonetics, and (5) spelling.

Jervey, J. W.: Reading Difficulty in Children, South Carolina M.A.J. 47:363-365 (October) 1951.



Gout— Recent Advances

Gout seems to be the result of an inborn defect of metabolism which manifests itself at some time or another as hyperuricemia and/or gouty arthritis. The blood of a large percentage of relatives of gout patients reveals hyperuricemia.

Some investigators maintain that hyperuricemia results from a single autosomal dominant gene. Only a small percentage of heterozygous

persons manifest gouty arthritis whereas homozygous persons are prone to have tophaceous gout as well. The changes that occur in the uric acid metabolism and the resultant symptoms can apparently be accounted for by the outpouring of steroid hormones during the alarm reaction. The alarm reaction may be precipitated by (1) emotion, (2) infection, (3) surgical procedures, (4) physical exertion, (5) allergy, (6) alcohol, (7) dietary indiscretion, and (8) drugs as liver extract.

Usually the first attack (stage 1) of acute gouty arthritis occurs suddenly. It lasts about three to ten days and then disappears completely. It affects the great toe or the instep, ankle, knee, or other region. The disease usually increases in tempo and severity, attacks coming on semiannually or oftener.

Later attacks (stage 2) are prone to be polyarticular and febrile. With the polyarticular stage subcutaneous tophi and involvement of bursae are common. Osseous tophi may be found in chronic gouty arthritis.

CLINICAL AND LABORATORY SUGGESTIONS

(See pages 28 and 29)

Form to be Used by Contributors

To: Clinical and Laboratory Suggestions Editor

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From: _____

Subject: _____

Explanation of Procedure:

Sketch:

Suggestions submitted cannot be acknowledged or returned.

\$10 will be paid on publication for each suggestion that is used.

In the third phase of the disease mental disturbances are frequently noted. The patient's memory is impaired. The speech becomes thick and slurred and the patient may become irritable.

Saline cathartic and colchicine may abort the early monarticular attack. This may be followed by sodium salicylate or cinchophen for a few days to combat hyperuricemia. Morphine may be employed to relieve pain in many cases. The diet should be low in purines and fats and high in carbohydrates. Alcohol should be avoided.

In chronic gouty arthritis fever, therapy may be required in prompt healing. In gouty nephritism a low protein diet and a more generous fluid intake are demanded. Corticotropin has been shown to influence uric acid excretion.

It hastens the control of the acute attack, but it can also precipitate an attack if given in a period of remission. Final evaluation of this hormone requires a more intensive trial. Cortisone does not appear to be of much value.

McCabe, E. S.: *Gout—Recent Advances*, Bull. School Med. Univ. Maryland 36:126-133 (July) 1951.



Surgical Treatment of Pain

Pain itself is a symptom. It is therefore never treated directly by surgery unless the primary source of the pain cannot itself be removed. When the relief of pain demands direct treatment there are several definitely planned operations which may be applied safely for the treatment of intractable pain. These are based upon an application of the anatomy of the nervous system.

The nervous system is anatomically so organized that functional units are discretely placed. As a result, the accurate surgical application of a knowledge of such functional anatomy may be used for the control of pain by intercepting those neural pathways which conduct certain sensory impulses from the source of irritation to the location of conscious

interpretation within the brain.

Frequently the patient who is considered to need surgical relief from intractable pain is in a state of extremis. His outlook for life may be extremely poor as in the patient with a pre-terminal carcinoma. Also there are cases where other extensive surgery has already been done and analgesic drugs may have been given to the point of addiction. In such patients the cessation of pain by any means is a welcome change for both the patient and all those concerned with him.

There are some patients with intractable pain who are not suffering a malignant disease. If freed of pain these persons would resume normal living. It is important in these persons that the relief of pain be obtained with little or no secondary effects upon the otherwise normal body.

Peripheral nerve section is rarely done. Most peripheral nerves serve a mixed sensory and motor function and one would hesitate to sacrifice the motor component. Under no circumstances should peripheral nerves to an extremity be cut. To do so would be to destroy important tactile, proprioceptive, and other types of perception. Peripheral nerves lie distal to the dorsal spinal ganglia, they can and do regenerate, which may result in a recurrence of the pain, disagreeable parasthesias, painful neuromas, and phantom phenomena.

Rhizotomy is the intraspinal severance of the dorsal spinal root between the spinal cord and the dorsal spinal ganglion. It is effective only for somatic pain, never for pain arising from visceral sources, unless, if done for the latter, the operation is extended over excessively wide levels.

Cordotomy consists of an incision within the spinal cord itself. It may be used for the control of either somatic or visceral pain, and it is the operation of choice in most patients with intractable pain such as arises from abdominal or pelvic carcinoma, malignant tumors of the spine, sacrum, or lower extremities, or for tabetic crises.

Three types of primary neuralgia often demand surgical treatment. These are: (1) trigeminal neuralgia,



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It has been estimated that 244,000,000 fillings are required to restore mouth health to American children of 6 to 18... and that 33,000,000 fillings are needed each year to fill new cavities. And America's increasing birth rate will continue to increase! Caring for children is a super-human task for 80,000 dentists who serve millions of adults.

While many child dental problems demand the attention of specialists, the main load must be carried by the remainder of the profession. Today's dentists need new techniques for quicker and more efficient operation. *Tru-Form Primary Crowns* meet these requirements. They make possible economical care for the children needing your help.

Rocky Mountain's preformed crowns have proved very successful in restoring carious areas in primary teeth. They can be placed in one sitting with an absolute minimum of pain. As *Tru-Chrome* is extremely strong and will not tarnish, both doctor and parent are proud of the durable, attractive restoration that will play a key role in the child's present and future dental health.

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- (2) glossopharyngeal neuralgia, and
(3) sphenopalatine ganglion neuralgia. The pain of trigeminal neuralgia may be limited to the distribution of one, two, or all three branches of the nerve. The only known permanent cure for this terrifying distress is section of the sensory root between the Gasserian ganglion and the point of entrance of the root into the pons.

Martin, John: Surgical Treatment of Pain, J. Michigan M. Soc. 51:213-215 (February) 1952.

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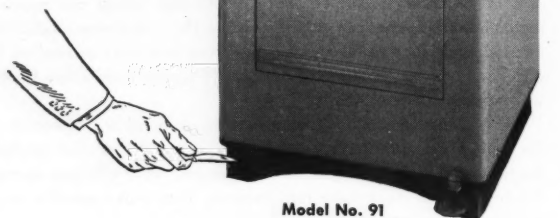
A Decalogue On Cancer for the Dentist

S. GORDON CASTIGLIANO, Oncologist and Chief of Head and Neck Service of the American Oncologic Hospital in Philadelphia, has set down the following ten commandments to be observed by the dentist:

1. Remember that 80 per cent of all untreated oral cancer patients are dead a short eighteen months after the onset of disease.

2. Remember that the rapid course of oral cancer makes it an emergency

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disease. Save a life; arrange for a biopsy at once when cancer is suspected.

3. Remember to maintain a high index of cancer suspicion. Think of cancer first when weighing the diagnostic possibilities of a soft-parts lesion in patients past 40.

4. Remember to examine both visually and digitally the entire mucous membrane, including the floor of the mouth whenever confronted by a patient past 40.

5. Remember that if an ulcerated

or nodular lesion fails to respond to supposed accepted treatment within a period of two weeks, delay no longer—get a biopsy!

6. Remember that leukoplakia is not a static disease. Malignant degeneration can and does occur, even after microscopic proof of benignancy. Cases of leukoplakia should be re-examined periodically.

7. Remember to arrange for excision of all localized areas of leukoplakia where excision is feasible.

8. Remember never to remove teeth

in a patient suspected of having malignant disease without consultation with the therapist who will treat the patient. Likewise, do not remove a tooth after irradiation without consultation.

9. Remember that a positive Wassermann in a patient means only one thing—that the patient has syphilis. It does not rule out cancer. Only an adequate biopsy can rule out cancer.

10. Remember it is not so important who does the biopsy (if correctly done), but it is important that it be done with an absolute minimum of delay. Arrange for biopsy by "phone," not by letter. Time makes all the difference in cancer management.

Adapted from Editorial, *Oral Surgery, Oral Medicine, and Oral Pathology* 5:1027 (Oct.) 1952.

An Evaluation of Calcium and Phosphorus Medication in Dentistry

Q.—Do calcium and phosphorus improve formation?

A.—It is useless to attempt to improve the structure of erupted teeth by means of calcium and phosphorus preparations. There is no body mechanism by which these minerals can be incorporated into the enamel of fully formed, erupted teeth, even if they were assimilated by the body. From birth to seven or eight years of age is the important period for the structure and composition of enamel. The first three years of life are especially significant with respect to the first permanent molars. A well-balanced diet may help to secure well-calcified teeth during this formative period. The teeth, once they have calcified, have just as good or just as bad a structure as they are going to have for the rest of their life.

Q.—Do calcium and phosphorus prevent caries?

A.—There is no direct positive evidence at present, either from laboratory or clinic, to substantiate a corre-

lation between calcium metabolism and caries in the child or the adult. Neither does the addition of these minerals to the mother's diet promote the development of teeth in utero that will be caries-resistant. On the contrary, there is evidence that such medication is unnecessary.

Q.—Does salivary potassium have any relationship to caries?

A.—Many data have been reported from studies of the chemical composition of saliva and the relationship to dental caries. In studies which involved calcium, phosphorus, carbon-dioxide capacity, pH, ammonia content and diastatic activity, no difference was shown between the saliva of the caries-free and the caries-susceptible individual. There is, however, little information in the literature about salivary potassium and its relationship to caries.

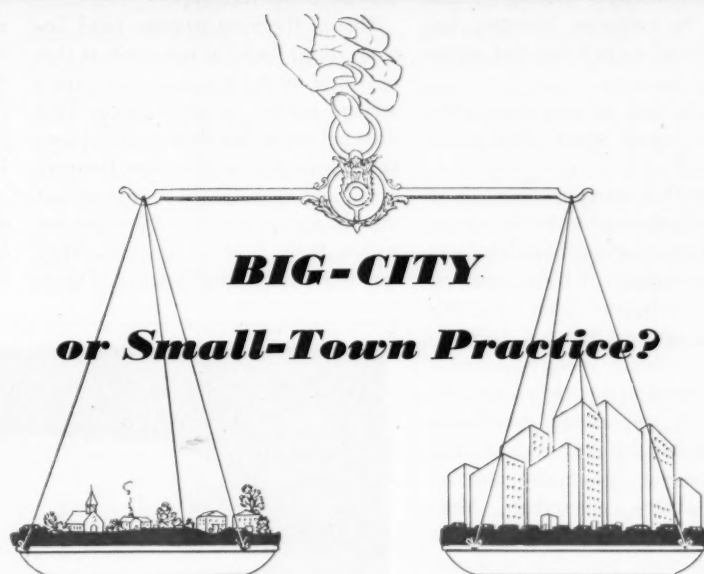
Q.—Does the calcium-phosphorus ratio in saliva or blood affect caries?

A.—Many studies are recorded in the literature about the calcium-phosphorus ratio in saliva as related to caries. Becks' work seems to be the most extensive and most reliable. He has been unable to establish any correlation between the calcium and phosphorus content of the saliva and caries-free or caries-active individuals. The literature on calcium-phosphorus ratio in the blood and its relationship to dental caries is not quite so revealing. The few studies that have been reported indicate that there is no direct relation between the teeth and the serum calcium and phosphorus.

Q.—Do calcium and phosphorus help prevent malocclusion?

A.—This specific question is bound up in the general question of nutrition. Rickets, a nutritional deficiency disease, is essentially a disorder of calcium and phosphorus metabolism. A critical examination of the question of malocclusion as a direct manifestation of rickets reveals that there is no essential relation between rickets and the form of the jaws or the position of the teeth. In support of this conclusion, one would expect to find an increased prevalence and an accentuation of malocclusion when nu-

In your ORAL HYGIENE this month



"Each young dentist who has graduated from dental school must make a decision about where to locate. The weary dentist in the city dreams about that small town he once visited and wonders whether or not he ought to go there and open an office; and the dentist in the country thinks of the advantages in a city practice and longs to pack and leave. Is there a fundamental difference between the two types of practice?"

Doctor Harold Gluck's interesting discussion of this ever-recurring question wins Oral Hygiene's award for the best feature published this month.

★ ★ ★
"Formula for a Draft Law"—In fairness to all groups covered by Public Law 779, certain principles and clarifications should be incorporated into a new draft law. The changes suggested are itemized in brief outline form.

★ ★ ★
"Fluoridation is Compulsory Medication," charges Doctor Arthur B. MacWhinnie. Though he himself approves and prescribes the use of fluorides to curb caries, he objects, in principle, to any municipality's forcing the people to accept such medication. He suggests that there are several forms in which fluorides may be administered at lower cost and in purer state than through a city's water supply.

Have you ever wished that you could turn over the routine, time-consuming details of your practice to a business manager? Read Edward H. Winsor's explanation of how such a manager may be employed by a group of dentists.

★ ★ ★
"The High Cost of Living vs. the Cost of High Living"—which one is really causing most of our financial problems? The author, James Robinson, believes it is much more likely to be the latter. He says, "The happiest men I have known in my life were those who were debt-free, insurance safe, and who enjoyed a healthful family life and private dental practice devoted to genuine human service."

★ ★ ★
"When Dentists Are Patients"—their viewpoint changes, wryly observes Doctor Joseph Murray. He relates frankly his varied experiences as a dental patient, and metes out both criticism and praise to the colleagues from whom he has received dental treatment.

★ ★ ★
"How to Slow Down"—Doctor C. W. Garleb suggests that slowing down is preferable to complete retirement, and quotes the opinions of many older dentists who have tried either or both plans. "Slowing down by more people would prevent many a nervous breakdown," he advises.

tritional conditions are worse than usual, as, for example, in the Central European countries during World War II. No evidence, however, has been produced to indicate that an increase did occur.

Q.—Does the calcium-phosphorus ratio in saliva or blood affect gingival disease?

A.—On this question there is a paucity of information in the literature. In a report of oral conditions in the famine districts of India, the high incidence of hypertrophic gingivitis attributed, at least in part, to long-continued specific dietary deficiencies. In commenting upon these deficiencies it was stated specifically that the mineral salts, calcium, and phosphorus were inadequate, and frequently absent altogether. Milk, meats, and green vegetables were to be had in very negligible amounts, and in some localities, not obtainable in any quantity.

Adapted from *Journal of Dentistry for Children* 19:96-97 (June) 1952.

Contra-Angles



Profile of a Scientist

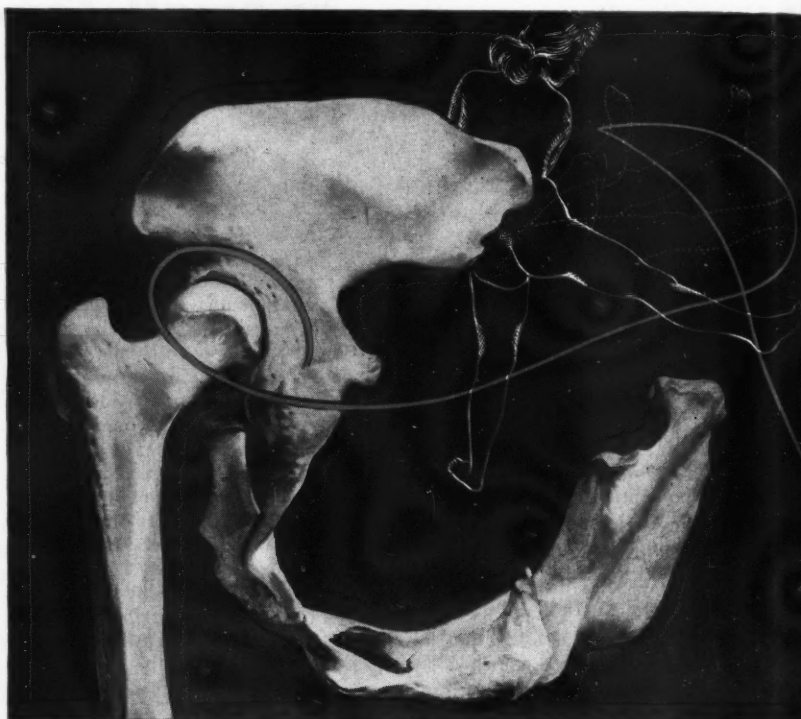
If you have a son who is stumbling around looking for his lifework, you may be interested in the personality sketches of 64 eminent scientists as they showed up on a psychologist's examination. Dentists will be interested particularly to know that more than half of the 64 scientists studied were the sons of professional men. Eight of the 64 were sons of farmers, 12 of business men, and 8 of clerks, salesmen, and men engaged in such occupations. Not one of the 64 was recruited from the ranks of unskilled labor. If you have a boy who is pointed toward the life of a scientist, you should begin to see signs of developing intellectual interests at an early age. The scientist is likely to

show early in his life a tendency to scholarship rather than a tendency to athletic competitorship.

One of the most striking (and disconcerting) facts in the study is that only 3 of the 64 scientists now have a serious interest in any church. That does not mean that these eminent men are unbelievers or even that they are practicing agnostics, it merely means that the formalities of religion are not within their field of interest. They may have, and probably many of them

do have, intense spiritual feelings; but these feelings are not expressed in formal church affiliations. In an article by Anne Roe, "A Psychologist Examines 64 Eminent Scientists," in *Scientific American* for November, there is this thumbnail sketch of the life and biography of a typical American scientist:

"He was the first-born child of a middle-class family, the son of a professional man. He is likely to have been a sickly child or to have lost a



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parent at an early age. He has a very high I.Q. and in boyhood began to do a great deal of reading. He tended to feel lonely and 'different' and to be shy and aloof from his classmates. He had only a moderate interest in girls and did not start dating them until college. He married late (at 27), has two children and finds security in family life; his marriage is more stable than the average. Not until his junior or senior year in college did he decide on his vocation as a scien-

tist. What decided him (almost invariably) was a college project in which he had occasion to do some independent research—to find out things for himself. Once he discovered the pleasures of this kind of work, he never turned back. He is completely satisfied with his chosen vocation. (Only one of the 64 eminent scientists—a Nobel prize winner—says he would have preferred to do something else: he wanted to be a farmer, but could not make a living at it.) He

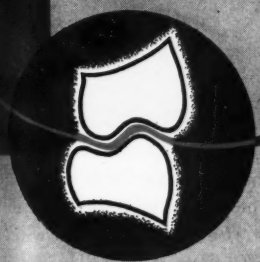
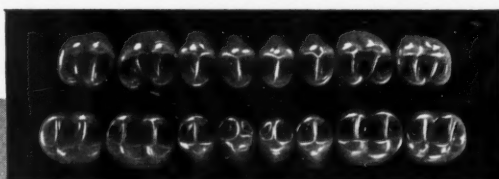
works hard and devotedly in his laboratory, often seven days a week. He says his work is his life, and he has few recreations, those being restricted to fishing, sailing, walking, or some other individualistic activity. The movies bore him. He avoids social affairs and political activity, and religion plays no part in his life or thinking. Better than any other interest or activity, scientific research seems to meet the inner need of his nature."

Sleep and What You Make of it

My friend, William H. Sheldon, the eminent constitutional psychologist, describes his bounding mesomorph, the fellow brimming with vim and vigor in the morning, as a cheerful fellow upon arising. He whistles as he wakes and has a smiling countenance and a hearty early morning manner. He is a curse and a nightmare to the other two body types, the round endomorph who is not easily stirred to wakefulness, and the long lean ectomorph who hates to go to bed and hates to get up. If we are ectomorphs ourselves and sons of mesomorphs, we probably remember the bullying that we received from our parents over the years because of our early morning slothfulness. And the little mesomorphs who spring from the germ plasm of ectomorphs are screaming and hollering in the early morning, pounding on the pipes and having missiles thrown at them by their nonunderstanding parents.

I have just learned that all these sleeping patterns are more than mere habits of orneriness, or cantankerousness. People sleep when they do and wake best when they do because of difference in their body temperatures. In general, the higher the body temperature, within normal limits, the more efficient one is; and the lower, the more slothful and sleepful. Just as the hibernating animal or reptile has a lower body temperature when he hibernates, so does man when the episodes of sleepiness descend upon him. We know that body temperature is not a constant and that the numbers 98.6 on the fever thermometer represent a relative reading. People in their hours

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of lessened activity often drop to 97.4 and temperatures of 99 degrees are within normal limits and do not indicate fever or infection. The higher the temperature, the more efficient the performance of the person. The person who reaches his maximum temperature at noon has his best skill at that time of day. So it goes with any period when the subject reaches his highest normal temperature. All normal values, whether of body temperature, of blood pressure, pulse rate, growth and development, eruption age of the teeth, are not precise pinpoints, but are more likely relatively wide ranges within which people can operate with efficiency and normality. Investigating the phenomenon of sleep, Nathaniel Kleitman, writing in the November *Scientific American*, makes these observations:

"Temperature affects life processes in many ways. Most protoplasmic activities, being chemical in nature, are speeded up by a rise in temperature and slowed down by its fall. Our bodies have a thermostatic mechanism which keeps the internal temperature

fairly constant, but it can and does fluctuate normally within a range of one or two degrees; the neat and precise marking of 98.6 degrees Fahrenheit as the 'normal' temperature on the ordinary clinical thermometer is rather meaningless. Our temperature regularly goes up and down each day on a fairly smooth, wave-like curve, with a peak or plateau in the middle of the waking period and a minimum at night during sleep. This diurnal temperature variation is not present at birth. It is acquired by each of us in the process of acculturation during the first year of life and thereafter is reinforced by our daily cycle of activities.

"Our body temperature is about the same just before we go to bed at night as when we rise in the morning, which explains why there is no difference in efficiency of performance. During prolonged deprivation of sleep, a subject's alertness in each 24 hours waxes and wanes with the rise and fall of the temperature curve, his greatest sleepiness coinciding with the temperature trough in the wee morning hours.

"To use a crude analogy, water in its liquid state may be likened to wakefulness, and, when frozen, to sleep. These two states of water can be distinguished from each other by direct inspection, as can frank sleep



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from wakefulness. But by feeling the water or ice with the hand, or, still better, by using a thermometer to determine its temperature, one can detect considerable gradations of cold in ice and of warmth in water. The freezing point and thawing point are identical and correspond to the drowsiness level of body temperature. The greater the agitation of the molecules, the higher the temperature of the water, which now represents increasing alertness with a rise of body temperature. The boiling of water at a certain temperature may be compared to the hyperactivity of a maniac. Quite a number of everyday expressions pertaining to human be-

havior are couched in temperature terms: Cold reception, warm greeting, feverish activity, boiling mad and so on."

All these interesting studies on the subject of sleep should concern us because of the different sleep habits observed within one's own family. The fact that a father, for instance, is an early riser and an early-to-bedder is not a physiologic reason why the other members of the family should behave in the same manner. The sleep requirements, the food requirements, the affection requirements of people vary greatly. The next time we have a problem with our teen-age child who prowls in the night hours and sleeps

until noon, we should remember that the child is not necessarily wilful but that his internal chemistry is such that his sleep requirements and habits are different from ours.

—E. J. R.

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